FINAL PROJECT OPERATIONS PLAN
REMEDIAL INVESTIGATION
SCIENTIFIC CHEMICAL PROCESSING (SCP) SITE
CARLSTADT TOWNSHIP, BERGEN COUNTY
NEW JERSEY

MARCH 4, 1987
JOB NO. 14485-002-10

Dames & Moore
CRANFORD, NEW JERSEY

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APPENDIX A - WORK/QA PLAN SHORT FORM

APPENDIX B - DAMES & MOORE HEALTH AND SAFETY PLAN

APPENDIX C - WIND ROSE DIAGRAMS

APPENDIX D - RESUMES (deleted; see September 18, 1986 POP for resumes)

APPENDIX E - ETC LABORATORY STANDARD OPERATING PROCEDURES (SEPARATE VOLUME)

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1.0 APPROVAL SIGNATURES

The undersigned have read and agree with the guidelines and procedures contained herein. This Project Operations Plan will be implemented by the project team as part of the remedial investigations to be undertaken at the SCP Site, Carlstadt Township, New Jersey.

Project Director — Date: March 9, 1987

Project Manager — Date: March 9, 1987

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2.0 INTRODUCTION

This Project Operations Plan (POP) has been developed specifically for use at the Scientific Chemical Processing (SCP) site in Carlstadt Township, Bergen County, New Jersey. The purpose of this document is to identify the specific procedures to be used in conducting the remedial investigation activities outlined in the Work Plan for the SCP site. Incorporated within this plan are the Site Operations Plan, the Health and Safety Plan, the Quality Assurance/Quality Control Plan and the Data Management Plan. This plan is consistent with the SCP Site Work Plan and USEPA's "Guidance on Remedial Investigations Under CERCLA" (May 1985).

This plan is the instrument of control for all field activities associated with this project. Procedures for field investigations, field sampling, laboratory analysis, quality assurance and health and safety information are provided in an integrated format. By providing this information in one document, a considerable amount of redundancy inherent in preparing separate documents is avoided. It also ensures that all pertinent information which needs to be disseminated to the project staff is available in a single reference document.

3.0 SITE DESCRIPTION

3.1 SITE HISTORY AND BACKGROUND

The SCP site is located at 216 Paterson Plank Road in Carlstadt Township, Bergen County, New Jersey, at latitude 40° 49' 30" N, longitude 74° 04' 38" W. The site is a corner property, bounded by Paterson Plank Road on the south, Gotham Parkway on the west, by Peach Island Creek on the north, and an industrial facility on the east (Figure 3-1).

The site was used by Scientific Chemical Processing, Inc. for recycling industrial wastes from 1971 until it was shut down by court order in October 1980. Prior to 1971, the site was reportedly operated by others for solvent refining and recovery since the 1950's.

While in operation, the facility received liquid wastes (primarily hydrocarbons) from chemical and other industrial manufacturing firms, then processed the wastes to reclaim marketable products, such as methanol, which were sold to the originating companies. In addition, other liquid hydrocarbons were processed to some extent, then blended with fuel oil, and the mixtures were typically sold back to the originating companies, or to cement and aggregate kilns, as boiler fuel.

In addition to the wastes noted above, the site also received other items, including paint sludges and acids, although it is not clear just what was intended in terms of their processing/disposition.

Cessation of operations at the site was ordered by the New Jersey Superior Court in 1980. At the time of the court-ordered shutdown, over 300,000 gallons of hazardous materials were stored on the site (Reference 1).

3.2 SITE LAYOUT

The site occupies a relatively flat, sparsely-vegetated area of approximately 5.9 acres. It is fenced on three sides (east, west, south), with the main entrance gate located on Paterson Plank Road, near the southeast corner of the site. Most operations were conducted in three sections of the site (Figure 3-2):

- Tank farm
- Still and boilerhouse
- Staging platform and thin-film evaporator

The tank farm has an unlined containment area that is depressed 1-2 feet with respect to the surrounding surface elevation. At one time, the tank farm contained 18 tanks. Presently, only four tanks remain at the site, and these are currently being removed. These tanks are marked as containing PCB's. The structural integrity of these tanks is suspect. Streaks of discoloration appear on the sides of several of the tanks. At least two tanks have been patched with epoxy sealants and makeshift wooden braces have been installed for additional support. Leaks have been reported from one or more of these tanks by USEPA and NJDEP.

The drum storage areas are now vacant, after nearly 4,000 drums were reportedly removed to the firm's Newark site sometime between May 1979 and December 1980. These drum storage areas, comprising the southeastern half of the site, are unlined and have no spill containment provisions, although a concrete pad exists in one drum storage area.

The still and boilerhouse section of the site contained tank trailers used to receive and feed substances run through the still. USEPA and NJDEP reported that the structural integrity of the tanks on the tank trailers (which have been removed off-site) was also suspect, with discoloration indicating the possibility of leaks. Furthermore, one of the removed trailer tanks was heavily patched with epoxy sealants and makeshift wooden braces. The former still site is surrounded by a small dike, but the trailer parking slots are not. The ground is covered by stones with a pink coloration that may indicate past spillage.

The staging platform was used for transferring and storing wastes. The thin-film evaporator and adjoining small tank farm, which contained 10 tanks, are surrounded by a cinderblock dike which is broken in several places. A trailer tank was located southeast of the small tank farm, and was marked as containing PCB's.

Additional features on the site include:

- Two abandoned small buildings near the site entrance reportedly used as a garage and office;

- Two apparent sludge disposal areas near the northeastern corner of the site (a 1979 aerial photograph shows a lagoon or sludge pit in the northeast quadrant of the site);

- The cut portion of tank buried near the tank farm (contents and configuration unknown);

- A few soil and miscellaneous debris mounds, possibly generated during the initial remedial measures and the dismantling of the facility;

- Miscellaneous debris, including crushed drums, strewn throughout the site;

- Some seeps of discolored ground water discharging into the Peach Island Creek, observed by Dames & Moore personnel during a July 1985 site visit; and

- Patches of discolored soil at various locations throughout the site.

3.3 ENVIRONMENTAL CHARACTERISTICS

3.3.1 Physiography

The site is located within the Piedmont Physiographic Province, in a filled section of the Hackensack Meadowlands, at an elevation of about 8 to 10 feet above mean seal level (Figure 3-1). Surface runoff appears to be primarily to the northeast into Peach Island Creek. The site is generally flat and covered mostly by fill composed of gravelly soil, with admixtures of various types of construction rubble, including concrete, bricks, and metal. The origin of this fill is not known.

3.3.2 Geology

The following section describes the general stratigraphy of the site as compiled based on regional geologic data and extensive boring data from the Meadowlands Sports Complex (Reference 2), located on Paterson Plank Road and adjacent to the SCP site. Generalized geologic cross sections based on these data are presented on Figure 3-3.

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This stratigraphic column at the site appears to consist of the following major units, in ascending order:

a) bedrock
b) glacial till
c) lacustrine silty clay
d) silty sand
e) meadow mats and peat
f) miscellaneous fill

These strata are described in more detail below.

a. Bedrock

The Piedmont Physiographic Province is locally characterized by Upper Triassic rocks of the Newark Group. These rock form the broad Piedmont Plain which slopes toward the southeast. The site is underlain by the Brunswick Formation, which consists predominantly of red shale and sandstone and dips gently to the northwest. This formation constitutes the principal regional aquifer (Reference 3).

Based on boring and well log data from the site vicinity (References 3 and 4), the top of the bedrock in the area is at a depth ranging from about 40 to 120 feet. These data suggest that on site the depth to bedrock would be approximately 60 feet (Figure 3-3), as compared to a depth of 295 feet presented in the RAMP (Reference 1).

b. Glacial Till

The bedrock is overlain by reddish brown till, consisting of a heterogeneous mixture of boulders, cobbles, gravel, sand, silt and clay. Within the area of the Meadowlands Sports Complex, located immediately south of the site, the till ranged in thickness from 5 to 40 feet. In the borings nearest the site the thickness of the till was approximately 15 feet.

c. Lacustrine Silty Clay

The till is overlain by a stratum consisting predominantly of lacustrine varved silty clay and occasional lenses of fine sand. In the vicinity of the site, this stratum consists of a near-surface desiccated gray-brown clay unit and a lower red-brown unit. The total thickness of the stratum at the site is estimated to range from about 20 to 30 feet. However, approximately 4,000 feet south of the site, this stratum is completely absent, whereas in some generally north-south trending subsurface channels it can be more than 100 feet thick (Figure 3-3).

d. Silty Sand

The sand stratum, consisting primarily of gray, medium to fine silty sand, ranges in thickness from about one to four feet.

e. Meadow Mat or Peat

The natural surface of the Meadowlands is covered with a layer of organic material commonly known as meadow mat or peat, consisting primarily of marsh vegetation in various stages of decay. Locally, the meadow mat is underlain by completely decomposed silty peat. The meadow mat varies in thickness from about 4 to 12 feet. Locally, however, this layer may be absent, possibly as a result of excavation and removal during filling operations.

f. Fill

Large portions of the Meadowlands have been used for years as a dumping ground for rubbish and solid waste, as well as for construction and demolition debris. This miscellaneous fill of unknown origin was generally randomly placed. At the site, the thickness of the fill is estimated to be about 5 feet.

3.3.3 Hydrology

Surface runoff appears to be primarily to the northeast into Peach Island Creek, which originates approximately 1,500 feet east of the site. At a point approximately 2,000 feet northwest of the site, Peach Island Creek discharges into

Berry's Creek, which in turn discharges into the Hackensack River at a point approximately 2.5 miles downstream from its confluence with Peach Island Creek. All of these water bodies are apparently influenced by tides.

Presently, there are no site-specific geohydrologic data available. However, based on the available stratigraphic information, ground water is expected to occur in a phreatic (unconfined) state within the miscellaneous fill and/or the underlying natural strata (meadow mats, sand) above the silty clay layer. Based on the topography of the site and the surrounding meadowlands, it is estimated that the phreatic ground water table is at a depth of approximately five feet.

A confined or perhaps semi-confined aquifer is expected to occur in the glacial till and the underlying bedrock. The Brunswick Formation is a known aquifer yielding water primarily from fractures in the relatively impervious rock. Ground-water yield is, therefore, dependent on the frequency and magnitude of fractures. Insofar as the lateral degree of fracturing varies considerably within the formation, ground water yield also varies. Fracturing decreases with depth, and therefore most of the ground water is produced by the upper, highly fractured part of the formation.

Well logs of several bedrock wells (Reference 7) drilled in the vicinity of the site indicated that the depth to the static water level in wells penetrating the deeper aquifer ranges generally from 10 to 50 feet and averages about 40 feet, indicating an artesian condition, as these wells are generally 150 to more than 400 feet deep and are uncased wells open to the aquifer below the overlying clay layer. Based on Dames & Moore's experience at sites with similar geohydrologic conditions, it is possible that water levels in the bedrock aquifer are influenced by tides.

There is no site-specific information available on the ground water flow direction. It may be assumed that the flow direction of the phreatic surface is to the northeast, toward Peach Island Creek, as suggested by at least two ground water seeps observed along the stream bank. However, the ground water flow direction may be influenced by tides, and therefore variable.

No site-specific information is available on the ground water flow direction in the bedrock aquifer. Regional data indicate that the flow direction depends on the rock fracture patterns and, therefore, may be highly variable.

3.3.4 Climate

Climate and meteorological conditions at the site have been characterized from weather records available from the National Weather Service at Newark International Airport. The airport is located approximately 6 miles southeast of the site in a similar physiographic setting. The data are considered representative of the site.

The climate of the site is humid and is typified by moist, warm summers and moderately cold winters with winds of moderate velocity. Prevailing winds in the area are from the southwest with only small seasonal variations in direction. The average annual temperature at the airport between 1944 and 1983 was 53.9 degrees Fahrenheit. In the summer, there are long periods of time when the weather remains very hot, especially when the wind is from the west-southwest and a Bermuda high-pressure system is established. Cold temperatures in the winter are experienced when continental polar winds are blowing from the northwest (Reference 5). Wind rose diagrams showing predominant wind directions are presented in Appendix C.

The average annual precipitation for the area is approximately 42 inches based on the data from 1944 to 1983. Precipitation falls fairly uniformly throughout the year, although the region is influenced by seasonal tropical storms and hurricanes.

Evaporation studies performed in the area between 1956 and 1970 show that the average annual Class A pan evaporation for Newark is 49.7 inches. Pan evaporation is highest in the month of July at 7.0 inches and lowest in the month of December at 1.6 inches (Reference 6). Free water surface evaporation is the amount of water evaporated from a shallow lake, wet soil, or other moist, natural surface. It is roughly 70 percent of the evaporation from a Class A pan for the same meteorological conditions. The annual free water surface evaporation for Newark is calculated to be approximately 35 inches. The average annual precipitation of 42 inches minus the average annual potential evaporation of 35 inches leaves a net precipitation of approximately 7 inches which, in theory, is the amount of water available for ground water recharge and surface runoff.

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3.4 REFERENCES

1. Remedial Action Master Plan (Draft), Scientific Chemical Processing Site, Carlstadt Township, Bergen County, New Jersey. EPA Work Assignment No. 01-2V65.0, Contract No. 68-01-6699, prepared by Resource Applications, Inc. under subcontract to NUS Corporation. RAI Project No. 830431-01, NUS Project No. 0701.30, January 1984.

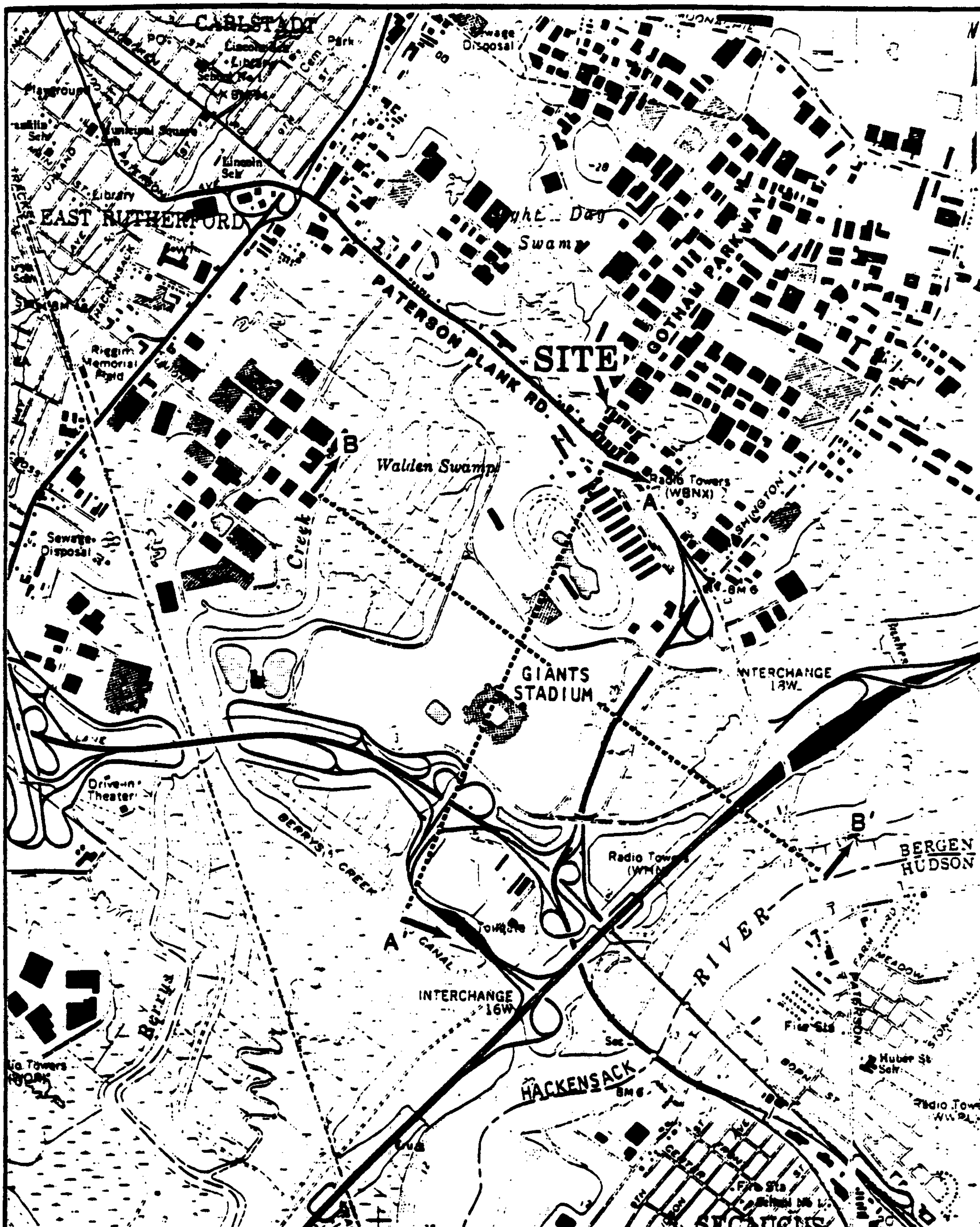
2. The New Jersey Sports Complex, Detailed Investigation of Subsurface Conditions, prepared by Frederic R. Harris, Inc. for the New Jersey Sports and Exposition Authority, October 1972.

3. U.S. Geological Survey, Appraisal of Water Resources in the Hackensack River Basin, New Jersey. Water Resources Investigations, 76-74.

4. New Jersey Department of Environmental Protection, Division of Water Resources, Miscellaneous Well Records, Carlstadt, New Jersey and Vicinity.

5. Dunlap, D.V., 1967. "The Climate of New Jersey" in: Climate of the States — A Practical Reference. Climatological Data of the United States, Vol. 1, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.

6. Farnsworth, R.K. and E.S. Thompson, 1982. Mean Monthly Seasonal and Annual Pan Evaporation for the U.S. NOAA Technical Report, NWS 34, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.



LOCATION MAP

SCP SITE

CARLSTADT, NEW JERSEY

KEY:

A A' CROSS SECTION LOCATION (SEE FIGURE 3-3)

0 2000 4000

SCALE IN FEET

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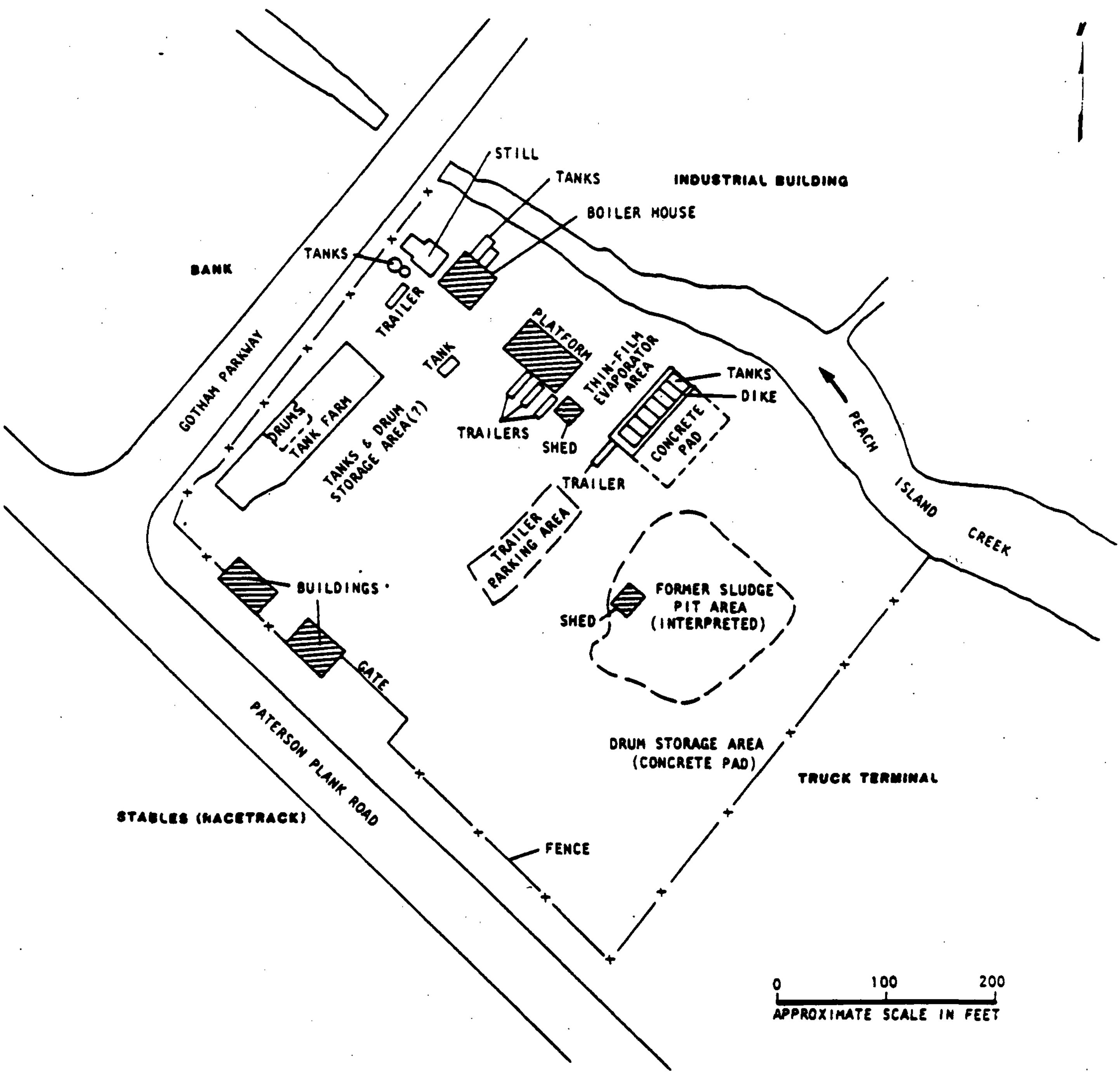
FIGURE 3-1



SITE LAYOUT
SCP SITE
CARLSTADT, NEW JERSEY

NOTES:
1. ALL DRUMS, MOST TANKS AND TANK TRAILERS HAVE BEEN REMOVED AND SOME FACILITIES HAVE BEEN DISMANTLED SINCE OPERATIONS CEASED IN 1979.
2. BASE MAP REFERENCE: AERIAL PHOTOGRAPH NO. 3818-6-35, MARCH 27, 1984. SCALE:1" = 100'±

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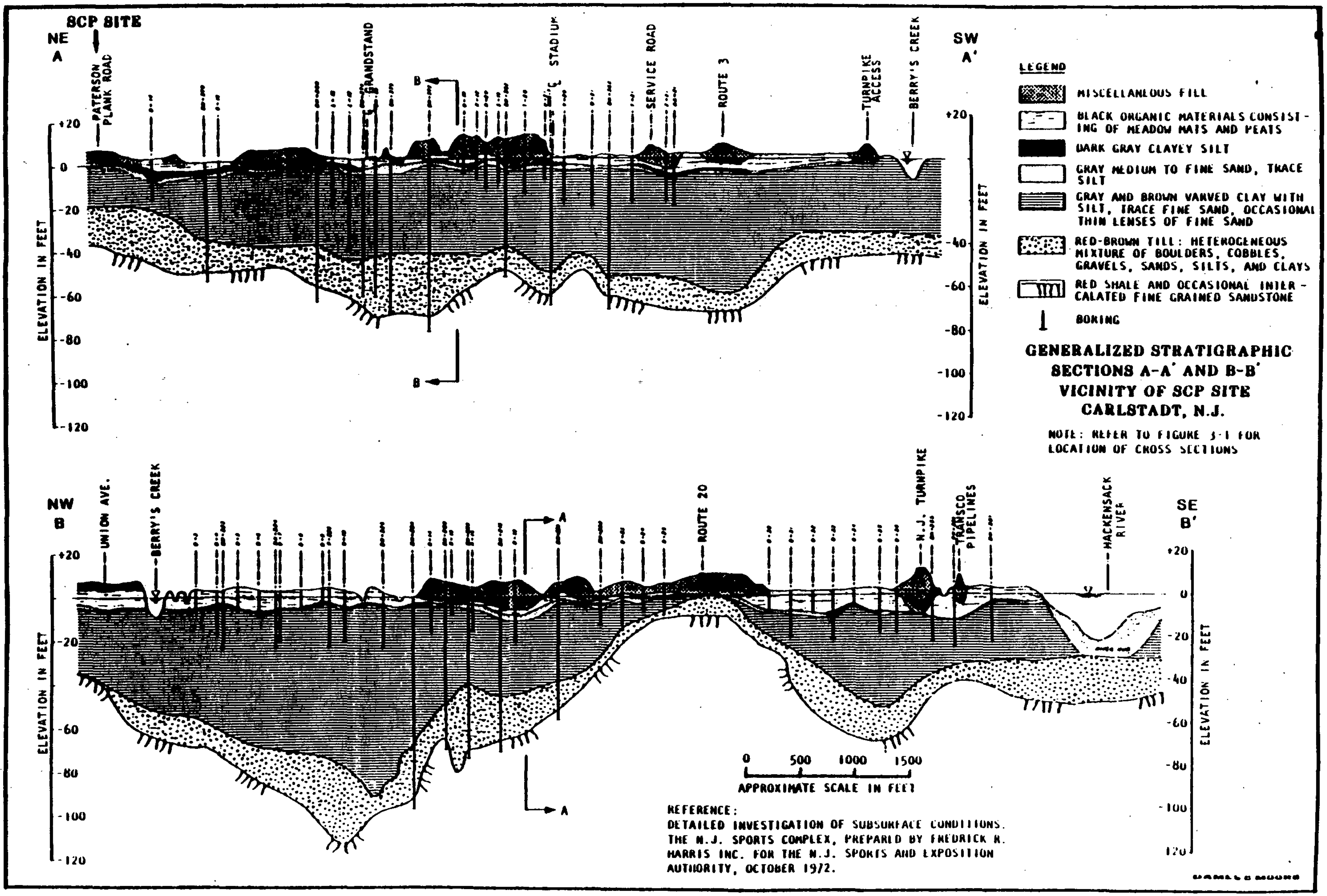
FIGURE 3-2


SCP SITE
NE
A
PATERSON PLANK ROAD
GRANDSTAND
STADIUM
SERVICE ROAD
ROUTE 3
TURNPIKE ACCESS
BERRY'S CREEK
SW
A'
ELEVATION IN FEET
+20
0
-20
-40
-60
-80
-100
-120
B
LEGEND
MISCELLANEOUS FILL
BLACK ORGANIC MATERIALS CONSISTING OF MEADOW MATS AND PEATS
DARK GRAY CLAYEY SILT
GRAY MEDIUM TO FINE SAND, TRACE SILT
GRAY AND BROWN VARVED CLAY WITH SILT, TRACE FINE SAND, OCCASIONAL THIN LENSES OF FINE SAND
RED-BROWN TILL: HETEROGENEOUS MIXTURE OF BOULDERS, COBBLES, GRAVELS, SANDS, SILTS, AND CLAYS
RED SHALE AND OCCASIONAL INTERCALATED FINE GRAINED SANDSTONE
BORING
GENERALIZED STRATIGRAPHIC SECTIONS A-A' AND B-B' VICINITY OF SCP SITE CARLSTADT, N.J.
NOTE: REFER TO FIGURE 3-1 FOR LOCATION OF CROSS SECTIONS
NW
B
UNION AVE.
BERRY'S CREEK
ROUTE 20
N.J. TURNPIKE
TRANSCO PIPELINES
HACKENSACK RIVER
SE
B'
A
0 500 1000 1500
APPROXIMATE SCALE IN FEET
REFERENCE:
DETAILED INVESTIGATION OF SUBSURFACE CONDITIONS. THE N.J. SPORTS COMPLEX, PREPARED BY FREDRICK R. HARRIS INC. FOR THE N.J. SPORTS AND EXPOSITION AUTHORITY, OCTOBER 1972.

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4.0 PROJECT OVERVIEW

The overall objectives of the proposed remedial investigation activities at the SCP site are to:

1. Evaluate and characterize the nature and extent, if any, of contamination on-site, as well as potential off-site contamination resulting from past site activities.

2. Assess the extent to which any detected contamination poses a threat to public health, welfare, or the environment.

3. Gather data for the development and evaluation of remedial action alternatives (feasibility study).

In addition to geophysical and hydrogeological investigations, environmental assessment studies will be performed at the SCP site on soil, ground water, surface water and sediment. Air quality will be monitored during site investigation activities to ensure the health and safety of on-site personnel. To achieve the overall objectives, the following field activities will be undertaken:

- Perform a site survey to establish site boundaries and to establish a site grid system for horizontal control of all field activities.

- Perform geophysical surveys (magnetometer and conductivity) to locate buried metal debris, estimate the extent of contaminant plumes (if any), and obtain additional site-specific stratigraphic data.

- Drill borings to evaluate stratigraphy.

- Install monitoring wells and piezometers to provide site-specific hydrogeologic data.

- Sample ground water, soils, surface waters and stream sediments to evaluate the nature and extent of contamination (if any).

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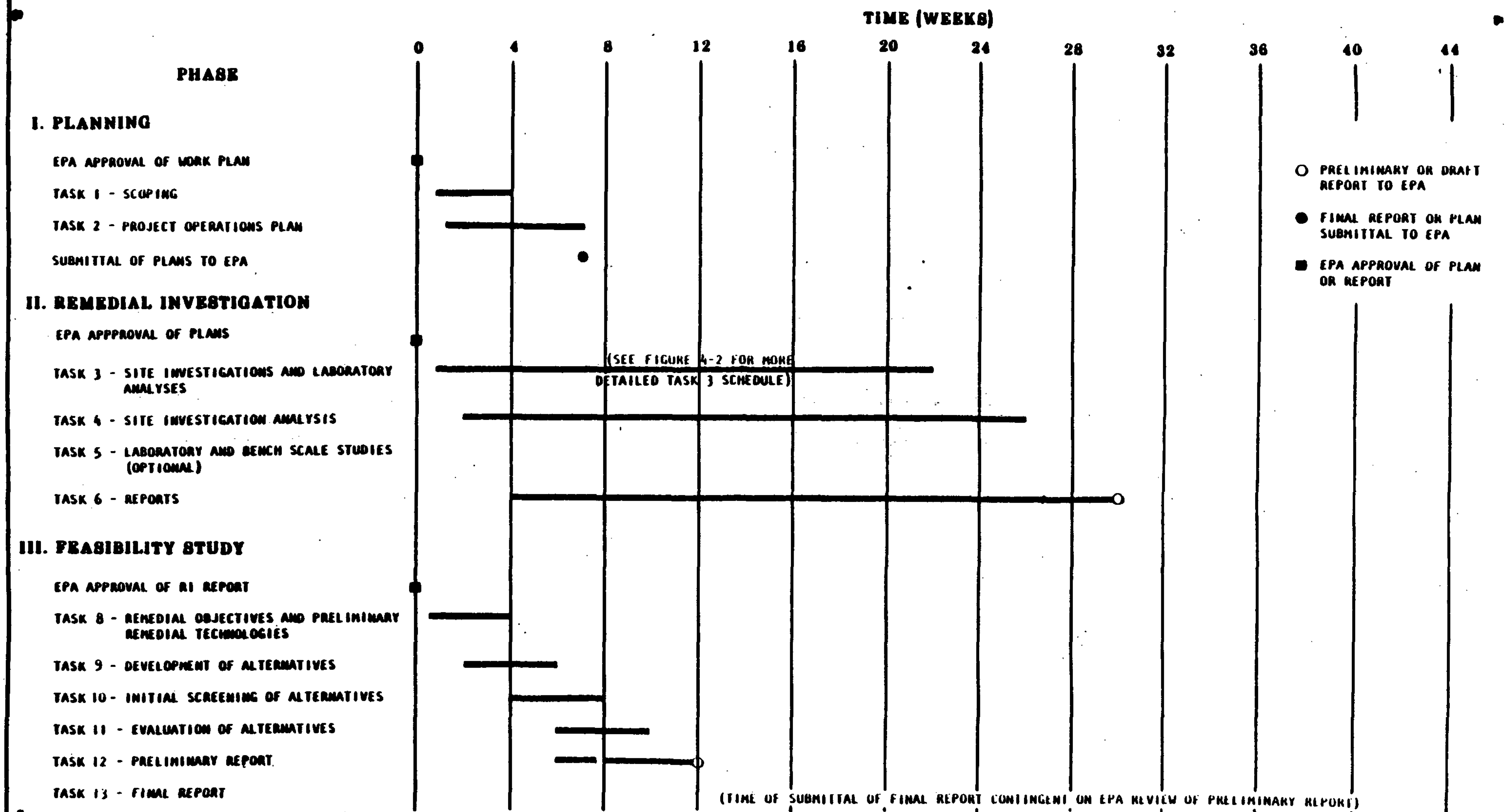
Detailed protocols for each of the activities listed above are described in Section 7. The overall RI/FS project schedule is shown on Figure 4-1. A schedule for completing the site investigation is presented in Figure 4-2.



NOTE:
1. SCHEDULE ALLOWS 5 DAYS FOR WEATHER DELAYS

TENTATIVE SCHEDULE
RI/FS INVESTIGATIONS
SCP SITE
CARLSTADT TOWNSHIP
BERGEN COUNTY, NEW JERSEY

FIGURE 4-1

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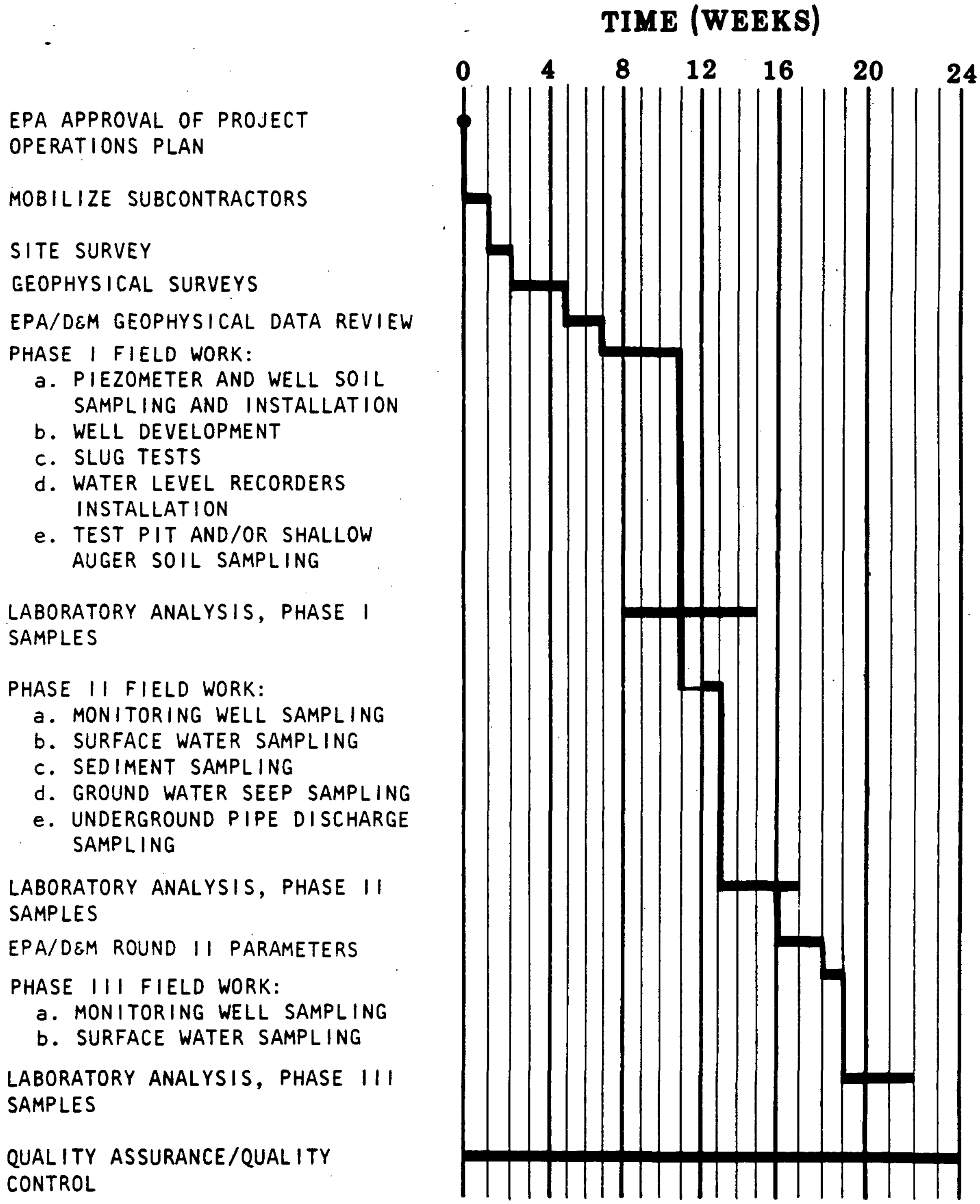

TENTATIVE SCHEDULE
TASK 3 - SITE INVESTIGATIONS

SCP SITE
CARLSTADT TOWNSHIP
BERGEN COUNTY, NEW JERSEY

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FIGURE 4-2

5.0 PROJECT ORGANIZATION AND MANAGEMENT

5.1 GENERAL

This section presents the project organization and qualifications of individuals selected to staff this assignment. Resumes for key personnel are included in Appendix D. A summary of other Dames & Moore personnel available to staff the assignment is provided in Table 5-1.

5.2 PROJECT ORGANIZATION

The project organization for the implementation of the RI/FS for the SCP site is shown on Figure 5-1. The Dames & Moore project team has been organized in three basic task groups:

1. Site Characterization Activities;

2. Risk Assessment Studies; and

3. Feasibility Studies and Remedial Engineering.

These task groups require specialized technical emphasis and analytical procedures. As a result, we have selected three experienced task group leaders with appropriate backgrounds for each of these work areas. The Task Group Leader will be responsible for planning and technical coordination of his portion of the project and report to the Project Manager. For example, the Site Characterization phase of the project will require emphasis on geohydrologic and environmental chemistry issues. Furthermore, successful performance of this phase will depend upon decisions regarding appropriate investigation methods, and data acquistion and site analysis. In comparison, we have shown the Risk Assessment task group as an independent element in the project organization. This is the important link between site characterization studies and the feasibility study where pathways analysis and contaminant factor and effects issues are addressed. The task leader and group personnel will require expertise in environmental chemistry, toxicology and health effects and they will interact with the remedial engineering group to guide the feasibility study.

The third major project element involves Feasibility Studies and Remedial Engineering tasks. This will be an integrated effort involving personnel with geohydrologic, civil and environmental engineering expertise. The emphasis will be on problem solution including technical, environmental, and cost analysis for remedial alternatives.

Supporting activities for the three main task groups are:

- Quality Assurance/Quality Control
- Technical Review Board
- Health and Safety Planning and Management
- Data Management
- Community Relations
- Regulatory Affairs

These project elements are shown at different levels within the project organization. The Quality Assurance Manager will plan, schedule and approve system and performance audits independently and report directly to the Project Manager. Our other support functions will be in the main project team. The QA/QC program will be planned and updated through the Project QA Manager and Task Group Leaders. The Technical Review Board will include individuals with expertise in areas consistent with the three major task group (i.e., site characterization, environmental chemistry/risk assessment, and remedial engineering). The Technical Reviewers will participate in the QA/QC program through peer review of the project plans and work products.

The Health and Safety Officer will support the project team as a subtask within the remedial investigation (site characterization activities). Data Management staff will organize and store all pertinent data to document the project. Similarly, the Regulatory Affairs and Community Relations personnel will report to the project team as required for periodic assistance during project activities.

Subcontractors selected for this assignment include:

1. <u>Surveyor</u>
   Andrew Marshall, Jr.
   Professional Engineers, Land Surveyors & Planners
   66 South Maple Avenue
   Ridgewood, NJ 07451
   201-444-3536

2. <u>Drilling Contractor</u>
   Engineering Drilling Company
   Windsor Road, RD 1
   Robbinsville, NJ 08691
   609-448-4472

3. <u>Analytic Laboratory</u>
   Environmental Testing and Certification (ETC)
   284 Raritan Center Parkway
   Edison, New Jersey 08818-7808
   201-225-5600

4. <u>Geophysical Contractor</u>
   Delta Geophysical Services
   116 West Main
   Clinton, New Jersey 08808
   201-735-9390

These firms have worked together quite successfully with Dames & Moore on similar projects in the past. These resources will be coordinated by the site characterization task leader. Technical aspects of the analytical program and activities of the analytical laboratory will be delegated to the environmental chemist to place appropriate technical emphasis as an important project element.

The Project Director will lead the overall project team and will report directly to the SCP Carlstadt PRP Committee on both contractual and technical matters. The Project Director, in conjunction with the project staff, will develop detailed project plans. Subsequently, the Project Director and Project Manager will review progress and redirect the project as required to achieve project objectives. As discussed, health and safety, and quality assurance staff will support the project management team with progress reports on respective program elements. Regulatory affairs staff will provide guidance, as required, regarding environmental control objectives and environmental affairs as they relate to remedial planning for the SCP site. This information will be communicated to the project management team and to principal investigators as necessary.

The Project Manager will be responsible for implementing project plans and managing the day to day activities of all project resources to achieve schedule, technical and financial goals.

Data Management will be conducted by the Project Manager to document all technical work to support the PRP Committee. The data base will include the following:

- sampling locations
- sample type
- analytic protocols
- analytical results by sampling point, parameter, and depth
- historical summaries of analytical data by parameter for all sampling points.
- offsite well locations
- offsite well descriptions
- offsite well water quality

- o quality assurance documentation (Chain-of-Custody forms, calibration records, system and performance audits, corrective action activities, unscheduled maintenance activities)

5.3 KEY PERSONNEL

Key personnel selected to staff this assignment and their relevant experience are described below. The attached table presents the qualifications of other waste management personnel available to support the project.

Project Director

The overall project will be directed by Mr. J.A. Koczan, a partner in our Cranford, New Jersey office. Mr. Koczan directed the RI/FS Work Plan preparation for Carlstadt. Mr. Koczan is a registered certified professional geologist and has over 15 years experience managing interdisciplinary environmental and engineering projects in New Jersey. He has directed planning and performance of remedial investigations and feasibility studies for petroleum product storage facilities, coal gasification plants, primary metal refineries and numerous other New Jersey industrial sites. Mr. Koczan is directing remedial investigations and feasibility studies for 44 sites of the U.S. Naval Air Engineering Center, Lakehurst, N.J. This project is being performed under review by the USEPA Region II technical and regulatory group. These projects involved the same issues that will be involved in the Carlstadt project. Mr. Koczan also directed preparation of remedial action plans for waste removal and ground water remediation for sites reviewed and approved by NJDEP. Projects have included design and implementation of site cleanup plans. Mr. Koczan has also provided expert testimony for ground water contamination issues.

Project Manager

Mr. Gerard Coscia, registered Professional Engineer, will serve as Project Manager. Mr. Coscia has eight years experience in geotechnical engineering, which includes engineering and design of remedial action programs of hazardous waste sites, treatability studies for waste stabilization, and feasibility studies for waste containment at various industrial facilities. Mr. Coscia has successfully managed several New Jersey RI/FS projects, including one project with a six-week schedule for remedial investigation, design and implementation of a cleanup plan. Negotiations with NJDEP for approval of the investigation and cleanup plans for this project enabled the tight schedule to be met.

Quality Assurance Manager

Ms. Elizabeth Neskow is a Quality Assurance Manager and Coordinator/ Project Administrator with Dames & Moore and has had 13 years experience in the area of quality assurance and project coordination. She has participated in field surveillance and performance of office and subcontractor audits. Ms. Neskow conducted quality assurance training of project personnel and quality assurance staff, and authored the firm's Quality Assurance Manual.

Site Characterization

Mr. Constantine Tsentas will undertake this task. Mr. Tsentas is a registered professional geologist with more than 12 years experience in geologic and hydrogeologic investigations. Mr. Tsentas was the Project Manager for the Work Plan preparation for the SCP project. He has participated with the USEPA, the NJDEP, the Connecticut DEP and New York State DEC on behalf of industrial clients in New York, Connecticut and New Jersey to perform numerous remedial investigations and feasibility studies involving ground water and soil contamination. Mr. Tsentas has been responsible for project management, development and implementation of field procedures for geohydrologic investigations, development and implementation of Quality Control/Quality Assurance and Health and Safety Plans, data analysis and report preparation.

Geohydrology

Dr. Donald J. Supkow, registered professional geologist, will serve as Senior Geohydrologist. Dr. Supkow has over 20 years experience in hydrogeology practice of which the past eight years has dealt almost exclusively with investigating sites with contaminated soil and ground water. He has designed and implemented remedial, investigative and ground water assessment studies for a broad range of industrial facilities. Dr. Supkow has also designed ground water recovery and aquifer restoration systems for sites contaminated with a variety of priority pollutants. Experience includes preparation of Part B applications under RCRA compliance, including application for Getty Refining, Delaware City Delaware, and Shell Oil, Oakwood, Illinois. As part of the project team, Dr. Supkow will be responsible for the development of geohydrologic investigative program analysis of soil and ground water conditions.

Contamination Migration

Dr. Andrew C. Mills is a Senior Geohydrologist with Dames & Moore and has had 17 years experience in the area of ground water quality and ground water supply investigations. He recently served as principal investigator in the characterization and analysis of ground water contaminant migration at two industrial sites in northern New Jersey. He performed an analysis of ground water flow beneath a chemical waste landfill near Port Arthur, Texas. Earlier, he was principal investigator in a study to characterize potential contaminant migration beneath a chemical landfill located near Albany, New York. His expertise is ground water modeling using computer programs.

Environmental Risk Assessment

Dr. Leslie Andrews, a Certified Industrial Hygienist, has more than 15 years experience as an Industrial Hygienist and Toxicologist and was previously a Research Associate with the Division of Environmental Sciences, School of Public Health, Columbia University. His prior experience includes evaluation of health hazards within industries, evaluation of environmental health problems, development of industrial hygiene and safety programs, and compliance assessments. Dr. Andrews has acted as principal investigator on several major projects regarding contamination. These projects involved remedial investigations and feasibility studies of sites including evaluations of environmental health impact of chemical waste disposal practices, chemical contamination of soils, and hazardous exposure potential. Dr. Andrews has also provided guidance for hazardous waste control and investigation of health risks.

Toxicology

Dr. Michael Gallo, consultant to Dames & Moore, would assist Dr. Andrews and provide technical support in the area of toxicology. Dr. Gallo is Associate Professor and Director of the Toxicology in the Rutgers Medical School Department of Environmental and Community Medicine. As consultant in the field of toxicology and health effects, Dr. Gallo provides technical assessments regarding potential effects of environmental chemicals and assists the project team plan remedial actions to adequately protect public health. Dr. Gallo has published extensively on toxicologic behavior and effects of a broad range of environmental contaminants.

Environmental Chemistry/Engineering

Mr. Joel B. Landes is an Environmental Engineer who prior to joining Dames & Moore was manager of environmental affairs for the bulk pharmaceutical and specialty chemical division of a major pharmaceutical manufacturer. He has directed assessments of soil and ground water contamination, and coordinated plans for remedial action, including design studies for extensive cleanup operations to comply with State and Federal regulations. He has examined alternative treatment strategies and designed complete remedial measures. Mr. Landes has had experience working in conjunction with USEPA Region II on various environmental matters relating to plants in New York State and Puerto Rico.

Remedial Engineering

Remedial engineering responsibility will be vested in Mr. Frank J. Vernese. Mr. Vernese has participated in more than 40 non-hazardous and hazardous waste management projects since 1980 alone. These have included hydrogeological, site selection, design, construction management of remedial actions and permitting studies for industrial, utility and government clients throughout the northeastern United States. For most of these projects he has negotiated with State and/or Federal regulators for the same types of issues that will be required for this project. These projects involved geotechnical and hydrogeologic evaluations and remedial design for regulatory approval. Recently, Mr. Vernese has completed a ground water remedial design project in New York which has been successfully implemented and approved by Federal and State agencies. Mr. Vernese has completed Closure and Post-Closure Plans and Closure and Post-Closure Financial Plans for waste management facilities, including landfills and 18 U.S. Steel plants. He has recently completed Closure and Post-Closure Plans for a solid waste management project for IBM, approved by Federal and State agencies.

Technical Review Board

The Technical Review Board will be comprised of Messrs. Stuart Edwards and David C. Cook, and Dr. Stephen Lemont. Mr. Edwards has been project manager and consultant on numerous non-hazardous and hazardous waste management projects as has Mr. Cook and Dr. Lemont. These have included hydrogeological, site selection, design, construction management of remedial actions and permitting studies for industrial, utility and government clients, including cooperation with State and/or Federal regulators for the same type of issues that will be required for this project. These projects involved geotechnical and hydrogeological evaluations and remedial design for regulatory approval.

Mr. Edwards has directed RI/FS projects in several EPA regions with responsibility of Project Director and Principal Investigator for remedial engineering. Mr. Cook was project manager of the RI/FS of the Vestal, New York, Municipal Water Supply well field, where concern was for contamination by organic compounds. His technical review area will involve the remedial investigation phase of this project. Dr. Lemont, a senior environmental chemist, has directed extensive site sampling and complex analytical programs to satisy U.S. Army criteria in the USATHAMA program. He will focus on site sampling chemical analysis.

5.4 CONTINGENCY PLANS

Plans have been developed to handle the following types of emergency scenarios:

- Change in severity of exposure
- Fire and explosion hazard
- Medical emergencies (site related and non-site related)

Exposure Potential

Equipment will be available and the site personnel will be prepared to upgrade the level of personnel protection up to level C, if there is change of site conditions warranting such precautions. If site conditions change such that personnel protection is to be upgraded to Level B, work will be stopped and the area evacuated until Level B equipment is acquired and prepared for use or until site conditions are returned to acceptable Level C or D protections.

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Fire and Explosion Hazard

Prior to work on site, local fire fighters will be advised of:

- Planned site activities
- Most up-to-date information (fire/explosion potential and toxicity) on the types of materials present at the site

Medical Emergencies

Site personnel will be adequately trained in first aid procedures. Local medical emergency facilities will have been contacted prior to commencement of site activities to advise them of:

- Planned activities

- Exact location

- Nature of potential contamination of project personnel who might be transported to the emergency facility as a patient

- Toxicology of expected pollutants at the site and prescribed treatment measures for acute exposures.

Arrangements will be made to provide the appropriate facilities for such eventualities. A detailed discussion of contingency plans is contained in Section 7.2.

TABLE 5-1

DAMES & MOORE

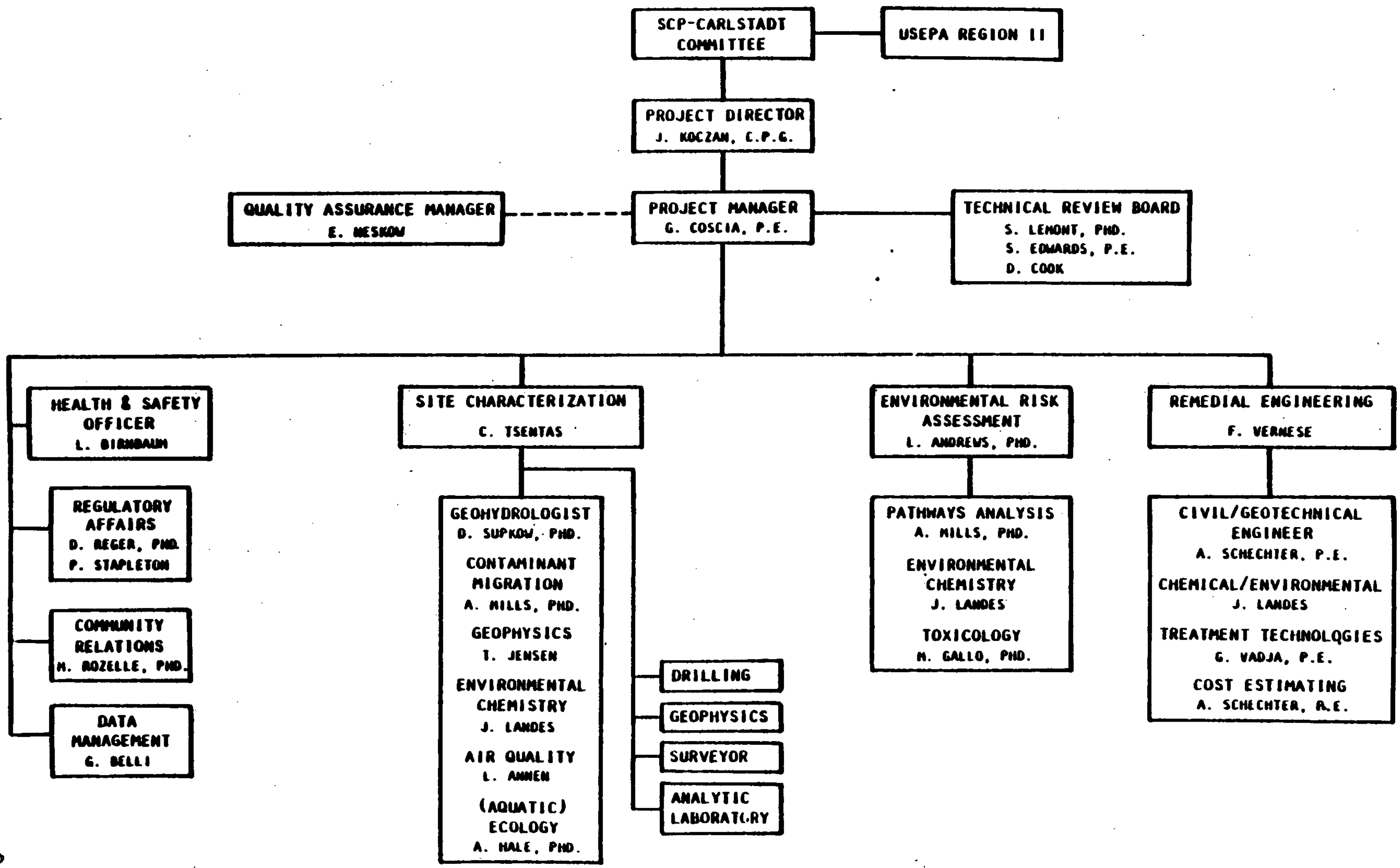
WASTE MANAGEMENT PERSONNEL — NORTHERN REGION

Discipline	Name	Degree	Years Experience
Chemical Engineering	Joan Dittman	B.S.	7
	Joel Landes	M.S.	15
	Thomas Harding	B.S.	17
	Alicja Kaminska	B.S.	1
	Maryann Link	M.S.	6
	Gail Muirhead	B.S.	2
	Gary Vajda	M.S.	16
Civil Engineering (Geotechnical and Design)	Gerard Coscia	M.S.	10
	James Dette	B.S.	27
	Anil Dharmapal	M.S.	4
	Stuart Edwards	B.S.	17
	Thor Helgason	B.S.	4
	Michael Hess	M.S.	18
	Dwarika Mallick	M.S.	3
	Scott MacEwen	B.S.	2
	William Mercurio	M.S.	20
	Richard Miller	M.S.	14
	V. R. Nivargikar	Ph.D.	22
	Frank Vernese	M.S.	17
	Ben Wang	M.S.	3
	Anna Woznyj	B.S.	1
	Jason Wu	Ph.D.	8
Ecology	Michael Ander	M.S.	13
	Allan Hale	Ph.D.	11
Environmental Air Quality	Roger Greenway	M.S.	18
	Larry Annen	M.S.	13
	Donald Sodersten	B.S.	13
	Denny Totzke	B.S.	8
Environmental Chemistry	John Flickinger	M.S.	15
	Stephen Lemont	Ph.D.	15
Environmental Engineering	Robert Berlin	Ph.D.	20
	John Checchio	B.S.	5
	John Fawcett	M.S.	8
	Noah Horowitz	M.S.	4
	Eric Lindhult	M.S.	6
	Blake Moyer	M.S.	4
	Michael Abramowitz	M.S.	15

TABLE 5-1 (continued)

DAMES & MOORE
WASTE MANAGEMENT PERSONNEL — NORTHERN REGION

Environmental Science	Craig DeBiase	B.S.	3
	John Englert	M.S.	7
	Jon Seekens	B.S.	1
	Jennifer Sullivan	B.S.	2
	Linda Wade	M.S.	10
Geohydrology	James McWhorter	M.S.	18
	Edward Gilligan	Ph.D.	11
	David Cook	M.S.	18
	Ralph Golia	M.S.	5
	Andrew Mills	Ph.D.	22
	Roger Moose	M.S.	17
	Donald Supkow	Ph.D.	22
	David Wagner	B.S.	3
Geology	Philip Barnes	M.S.	1
	Robert Blauvelt	M.S.	18
	Wayne Fuller	M.S.	3
	Christine Grill	B.S.	2
	Andre Ivanciu	M.S.	5
	Anthony Kaufman	B.S.	4
	Julius Koczan	B.S.	20
	William McCune	B.S.	4
	Stephen Van der Hoven	B.S.	2
	Thomas McKinney	Ph.D.	22
	Roger Pennifill	M.S.	8
	David Raubvogel	M.S.	4
	Constantine Tsentas	M.S.	14
	Bruce Scarbrough	M.S.	4
	Thomas Schmidt	B.S.	2
	Scott Sklenar	M.S.	4
	Theodore Toskos	M.S.	5
Geophysics	Thomas Jensen	M.S.	17
Public Participation	Martha Rozelle	Ph.D.	17
Quality Assurance	Elizabeth Neskow	M.B.A.	15
Regulatory Affairs	Philip Stapleton	B.A.	8
Toxicology (Risk Assessment and Health & Safety)	Les Andrews	D.P.H.	16
	Leslie Birnbaum	M.PH.	7
	David Dahlstrom	M.S.	13
	Michael Gallo (Consultant)	Ph.D.	16



PROJECT ORGANIZATION CHART
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
SCP INC. SITE, CARLSTADT, N.J.

FIGURE 5-1

000375

6.0 QUALITY ASSURANCE OBJECTIVES

This project involves a site investigation program to gather data on potential contamination existing at the SCP site. The data will be used to determine if a threat exists to the public health and safety, or the environment, and to evaluate remedial alternatives. The objective of the quality assurance project plan is to provide a mechanism for control and evaluation of data quality throughout the course of the project. The quality control data and system audit results will be used to define the precision and accuracy for measured contamination values.

The activities required for QA/QC to meet this objective will be implemented in accordance with the guidelines provided in the WORK/QA Plan Short Form (Appendix A) and the procedures contained in Sections 7 through 16 of this document. Brief descriptions of some of the activities to be conducted under the QA/QC program are discussed below.

6.1 FIELD CHARACTERIZATIONS

Each phase of the field investigation is subject to QA/QC controls. Field investigations planned as a part of site characterization will include:

- Topographic surveying
- Magnetometer surveying
- Terrain conductivity surveying
- Piezometer installation
- Monitoring well installation
- Ground water elevation measurements
- Soil sampling
- Field permeability testing (slug or injection tests)
- Laboratory permeability testing
- Monitoring well sampling
- Sediment sampling
- Seep sampling
- Surface water sampling

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6.2 ACCURACY AND PRECISION

To provide quality assurance on the accuracy and precision of test results on samples obtained in the field, duplicate samples and trip blanks will be used in the sampling program. Additionally, accuracy and precision will be quantitatively evaluated by the laboratory by the use of spiked samples.

6.2.1 Duplicate Samples

For each type of sample (ground water, soil, sediments, etc.) one (1) sample will be collected for duplicate analysis for every twenty (20) samples collected. If less than twenty (20) samples are to be collected in a particular media, one (1) sample is still to be collected as a duplicate for each set or round of sampling.

6.2.2 Trip Blanks

Each trip blank will be prepared by the laboratory using organic-free deionized water. The trip blank consists of a set of sample containers filled with laboratory demonstrated analyte-free water. The containers remain sealed at all times, and accompany the sample bottles from the laboratory to the site and back to the laboratory. This blank will evaluate the sample container preparation procedures, and any potential contamination which may have diffused into the sample containers. One set of trip blanks will be required for each set of containers per matrix returned to the laboratory. For example, if sample containers for two days sampling are received on one day, but the samples are returned to the laboratory at two different times, two sets of trip blanks will be used. Trip blanks will be analyzed for priority pollutant volatile organic compounds.

6.3 REPRESENTATIVENESS

The representativeness of a sample (i.e., does the sample have the same characteristics as an average portion of the media being sampled) is controlled by the sampling method utilized. Duplicate samples collected as part of the field programs will monitor the representativeness of specific samples. The detailed sampling procedures which will be used to control representativeness are contained in Section 7. The following are summaries of the more significant steps to be taken:

- Ground-water samples will be collected after first evacuating at least three well casing volumes of water. The well will then be allowed to recharge to ensure that aquifer water is being sampled. The total amount of water evacuated will be documented by the sampling team.

- Surface water and sediment samples will be collected from the center of the water body cross section, and if possible, at mid-depth. Mid-channel samples are more likely to be representative since aeration is minimized. Care will be taken to collect surface water samples in such a manner as to allow as little sediment as possible to enter the sample bottle.

- Soil samples will be collected at locations exhibiting discoloration or other tangible evidence of contamination to represent "worst-case" conditions. Results of headspace analysis using the OVA or PID may also be used as a guide for "worst-case" samples. The "worst-case" samples will, by definition, be biased and non-representative.

6.4 COMPLETENESS

The criteria of completeness is a measure of the amount of valid data obtained from the measurement system compared with the amount that was expected under normal conditions. This criteria is expressed as a percentage. One hunderd percent (100%) complete data is desired. The acceptability of less than 100 percent data will be evaluated on a case specific basis.

6.5 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

The primary objective of the analytical quality assurance/quality control plan is to ensure the integrity of analytical results. To this end, all samples collected during the project will be analyzed by ETC. The QA/QC procedures for this laboratory are approved by the EPA. These procedures are detailed in Appendix E.

7.0 FIELD INVESTIGATION ACTIVITIES/SAMPLING PROCEDURES

7.1 INTRODUCTION

The purpose of this section is to identify the specific sampling and analytical, quality control and assurance, health and safety procedures to be utilized in the field investigation conducted at the SCP site. Procedures for sample collection are based upon the standard operating procedures for meeting quality control/assurance requirements. Health and safety procedures and requirements are based upon the site Health and Safety Plan. It is intended that this plan be adhered to and that identified procedures followed to assure valid analytical results.

7.2 HEALTH AND SAFETY PROCEDURES

This section describes the health and safety project objectives for the SCP site. In addition to the description of objectives provided in this section, highlights of the health and safety issues specifically related to the proposed field activities are described as a part of the activity descriptions presented in Sections 7.4 through 7.14. The ultimate goal of all health and safety discussions is to describe the steps taken to ensure the protection of project personnel as they are performing the tasks required by the RI/FS.

7.2.1 Health Monitoring Program

The health monitoring program is designed to monitor the health and activities of Dames & Moore personnel involved in work on hazardous materials management projects.

The purpose of this program is to assess whether the Dames & Moore personnel involved in field work on sites which may contain hazardous substances are physically fit for using the personal protection equipment associated with hazardous site work, to determine whether pre-disposing conditions exist which would make it inadvisable for an individual to work in areas containing toxic substances, and to monitor those employees' health status.

7.2.1.1 Medical Examinations

The program consists of a standard baseline medical examination for all appropriate personnel to be performed at clinics designated or approved by the Dames & Moore Firmwide Health and Safety Program Office. The results of the examinations are reviewed by a medical consultant, who evaluates an individual's suitability for assignment to hazardous materials management projects. Confidential records of the examinations are centrally maintained by the Firmwide Health and Safety Program Office, which functions as the coordinating entity between the Dames & Moore personnel, medical clinics, and outside medical consultant.

Annual followup examinations of the involved personnel are conducted to update the employee's work and medical history and current status.

The baseline physical consists of the following components:

Medical/Occupational Questionnaire, including:

- Familial history of disease/illness
- Employee assessment of his/her health
- New or perceived medical problems
- Current medical information
- Employee assessment of exposures
- History of occupations
- Profile of hobbies/activities relative to health
- New injuries and illnesses
- Changes in living habits
- Psychological and stress evaluation

Specialized Exposure Questionnaire, including:

- Employee assessment of exposures
- History of occupations

Profile of hobbies/activities relative to health

Audiometric Examination — measurement of hearing sensitivity from 500 to 6000 Hertz, including an otoscopic examination of the ear for wax.

Pulmonary Function Test — measurement of lung capacity through the following factors:

Forced Vital Capacity (FVC)
Peak Expiratory Flow (PEF)
Forced Expiratory Volume, One-Second (FEV_1)
Forced Expiratory Volume, Three-Second (FEV_3)

Vision Test, including

Far acuity left, right and both
Near acuity left, right and both
Depth perception
Color perception
Phoria far, lateral and horizontal
Phoria near, lateral
Perimeter vision; lateral, nasalward

Vital Signs — measurement of height, weight, blood pressure and pulse.

Serum Chemistry Determination — analysis of blood serum for the following:

Alkaline Phosphatase
Bilirubin, Direct
Bilirubin, Indirect
Bilirubin, Total
Calcium
Chloride

Chloresterol, Enzymatic
Creatinine
GGTP
Glucose
Iron, Total
LD (LDH)
Phosphorus
Potassium
Protein, Total
    Albumin
    Blobulin
    A/G Ratio
SGOT (AST)
Sodium
Triglycerides
Urea Nitrogen (BUN)
Urea Nitrogen/Creatinine Ratio
UricAcid

Complete Blood Count with Differential — The Complete Blood Count is a calculation of the number of red and white blood cells in a cubic millimeter of blood, by means of counting the cells in an accurate volume of diluted blood. The differential is the enumeration of the number of white blood cells in a stained film of blood, including a determination of the approximate percentage of each variety of leukocyte present. These determinations provide the physician with a means of assessing such illnesses as leukemia, leukopenia, anemia, and/or blood dyscrasias occurring from exposures to toxic substances.

Blood Lead Determination — An analysis of the blood to determine the level of lead present.

Lead Questionnaire — The Lead Questionnaire includes detailed physicological, occupational and personal information relevant to lead exposure.

ZPP Determination — The Zinc Protoporphyrin (ZPP) Determination is a measurement of the content of zinc protoporphyrin of the red blood cells. An elevated ZPP level indicates either exposure to lead or iron deficiency.

SGPT Determination — An analysis of the blood serum for the level of serum glutamic pyruvic transaminase, which is used to track liver function.

Urinanalysis with Microscopic Examination — An analysis of certain chemical and physical characteristics of the urine. This analysis includes color, appearance (or clarity) and a specific gravity measurement by refractometer, along with a qualitative exam by dipstick (Ames "Bili-Labstix") for pH.

Chest X-Ray — A 14 x 17" Posterior/Anterior Chest X-Ray taken and read by a Board-Certified radiologist.

Electrocardiogram — A recording of the electrical currents that traverse the heart and initiate its contraction to determine whether cardiac abnormalities are present.

Physical Examination/Interview — Encompassing the following parameters:

Neurological toxicity
Dermatological toxicity
Colon/rectal cancer
Abnormalities of the spleen
Abnormalities of the liver
Abnormalities of the lungs/thorax
Injected or unusual mucosa
Palpable masses
Nose/sinus problems
Eye and ear problems
Prostatic, genital and pelvic cancers

Special Tests

Heavy metals screen
Cholinesterase RBC (pesticides)
PCBs

Respirator Usage Review — Review of the results of the medical examination (Baseline or Annual) by an occupational health physician to evaluate the ability of the individual to use a respirator.

7.2.1.2 Firmwide Health and Safety Program

The Dames & Moore Waste Management Services Program Manager directs and supervises the activities of the Firmwide Health and Safety Program through the Firmwide Health and Safety Program Office. The authority to administer and oversee the Firmwide Health and Safety Program Director who reports directly to the Chief Operating Officer. The Firmwide Health and Safety Program Office, representing firmwide management, administers the firm's health and safety program by:

- Developing and documenting Dames & Moore health and safety standards and requirements.
- Providing technical assistance in health and safety matters to line (office) management.
- Defining action levels and appropriate response mechanisms for the type and concentration of contaminants at a site.
- Developing health and safety plans for activities involving hazardous substances.
- Collecting and assessing health and safety performance data.

- Supervises the medical program.

- Establishing training standards and conducting training programs.

- Conducting health and safety audits, inspections, and appraisals, and followig up on corrective actions taken.

- Defining equipment and instrumentation requirements, procurement procedures, and operational standards.

7.2.1.3 Office Safety Coordinator

The Office Safety Cocrdinator (OSC), in the role of local health and safety representative, provides direct support and guidance to office and project management in matters of health and safety. The OSC represents the Firmwide Health and Safety Program Office and administers the Firmwide Health and Safety Program at the local level. The duties of the OSC include:

- Validating that the requirements of the medical surveillance program have been implemented.

- Providing consultation to project personnel regarding health and safety practices.

- Reviewing and approving health and safety plans prepared for projects and seeing to it that they are properly implemented.

- Monitoring of health and safety activities during performance of field work.

- Maintaining and managing of office health and safety equipment and supplies.

7.2.1.4 Project Manager/On-Site Safety Officer

The Project Manager (PM) shall direct on-site investigations and operational efforts. At the site, the PM, assisted by the on-site Health and Safety Officer, has the primary responsibility for:

1. Assuring that appropriate personnel protective equipment is available and properly utilized by all on-site personnel.

2. Assuring that personnel are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and in planned procedures for dealing with emergencies.

3. Assuring that personnel are aware of the potential hazards associated with site operations (see Appendix B, Tables 1 and 2).

4. Monitoring the safety performance of all personnel to ensure that the required work practices are employed.

5. Correcting any work practices or conditions that may result in injury or exposure to hazardous substances.

6. Preparing any accident/incident reports (see Appendix B, Accident Report Form).

7. Assuring the completion of Plan Acceptance and Feedback forms (see Appendix B).

7.2.1.5 Project Personnel

Project personnel involved in on-site investigations and operations are responsible for:

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.

2. Implementing Project Health and Safety Plans, and reporting to the PM for action any deviations from the anticipated conditions described in the Plan.

3. Performing only those tasks that they believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the PM.

7.2.2 Health and Safety Training

Project personnel involved in field work at the site are required to have attended, as a minimum, the Dames & Moore 40-hour Hazardous Material Sites Training Course or the EPA 40-hour course entitled "Personnel Protection and Safety". Both courses cover hazard recognition; the fundamentals of respiratory protection; selection, use and limitations of respiratory protective equipment, protective clothing, and air monitoring instruments; sampling; and standard operating and emergency procedures for conducting activities on sites containing hazardous materials. Approximately one half the course is the hands-on use of personnel protective equipment, monitoring instruments and practical exercises, the other half consists of classroom instruction and discussion.

7.2.3 Monitoring and Personnel Protection Equipment

Air monitoring, as well as visual and olfactory observations, will serve to provide a constant awareness of field conditions. A wind direction indicator will be visible to field personnel during all field activities. Air monitoring will be conducted using a photoionization detector (PID) and/or an organic vapor analyzer (OVA), and select detector tubes (chloroform and carbon tetrachloride), throughout the field investigations. Initially, Level D+ protection will be used. Upgrading from Level D+ to Level C will occur if any contaminant levels measurable above background are detected with the PID or OVA. Upgrading from Level D+ or Level C to Level B will occur if carbon tetrachloride levels of 5 ppm or greater or chloroform levels of 2 ppm or greater are detected with the tubes, or if the PID or OVA reading is greater than 5 ppm. Personnel will leave the site and re-enter only after Level B protective equipment has been donned or the conditions requiring Level B protection have changed. Upgrading may also occur if visual or olfactory observation indicate a worsening of field conditions. Downgrading from Level B to Level C or Level D+ or from Level C to Level D+ will occur only after monitoring shows stable safe conditions. If downgrading to Level D+ occurs, continual monitoring with a PID and/or an OVA will be required to confirm the adequacy of Level D+ protection. Final determination of the level of protection required and the need for upgrading or downgrading is the responsibility of the on-site Health and Safety Officer.

Monitoring methods, action levels and protective equipment required for on-site activities are present in Appendix B, Dames & Moore Health and Safety Plan, Site Investigation, SCP Site, Carlstadt, New Jersey.

7.2.4 Field Procedures

On a day to day basis, field health and safety procedures are under the control of the on-site Health and Safety Officer. Guidance for the on-site activities is provided in the Dames & Moore Health and Safety Plan, Site Investigation, SCP Site, Carlstadt, New Jersey, presented in Appendix B. This plan will be presented to all personnel involved in on-site activities and provides background information on the site, emergency contacts and procedures, hazard characteristics/monitoring methods and protection required, standard safe working practices, and decontamination procedures.

7.2.4.1 Disposal of Contaminated Personal Protective Equipment

All disposable personal protective equipment, plastics and paper will be stored in doubled heavy duty plastic bags. At the completion of the Remedial Investigation, the bags will be disposed of at a landfill which accepts ID-27 wastes.

7.2.4.2 Emergency Evacuation

In the event of an emergency situation requiring evacuation of field personnel or local residents, the following procedures will be followed:

1. The on-site Health and Safety Officer will sound two blasts on an air horn. Hand signals are not recommended.

2. All personnel leaving the Exclusion Zone will proceed directly to the Contamination Reduction Zone through the access control point, if possible. Decontamination procedures will be carried out to the greatest possible extent in that such a delay will not pose an unreasonable risk to the safety of on-site personnel.

3. Personnel will remain out of the exclusion area (as far away as necessary) until the on-site Health and Safety Officer determines it is safe toresume on-site work.

4. Local Fire and Police Departments will be contacted to establish procedures for evacuation of local residents in the event of a severe emergency.

7.2.4.3 Explosions and Fires

Prior to work on the site, the local fire fighters will be advised of the planned site activities and information on the types of materials present at the site. In the event of an explosion or fire, the on-site Health and Safety Officer shall take the following minimum precautions:

1. Evacuate all unnecessary personnel from the area, if possible to an upwind location.

2. Request emergency response assistance (rescue squad, fire department, hospital, poison control center) as needed, for any injuries or exposures to hazardous chemicals.

3. Notify Region II, USEPA of the incident.

7.2.5 Health and Safety at the SCP Site

An initial site reconnaissance will be performed prior to the initiation of field work at the SCP site. Based upon readings collected with a PID and/or an OVA during the site reconnaissance, a level of protection will be selected for non-ground intrusive site activities. It is anticipated that all activities at the site that are not ground intrusive can be accomplished under Level D+ protection. Air monitoring with a PID and/or an OVA will be conducted throughout the field investigation. The level of protection will be upgraded if indicated by air monitoring or if a change in field conditions occurs. Protective equipment needed for on-site activities are presented in Appendix B, Dames & Moore Health and Safety Plan, SCP Site, Carlstadt, New Jersey. In addition, Level C protective equipment will be easily accessible at all times. If the results of monitoring warrant or if a change in field conditions occurs, it may be necessary to upgrade Level C or Level B (see Appendix B). There will be contingency for downgrading or upgrading the protection level if either action is deemed appropriate by the on-site Health and Safety Officer.

7.2.6 Contaminant Concentrations

Table 7-1 provides an indication of the types and possible concentrations of pollutants that may be encountered at the SCP site. This table is not a comprehensive list of site contaminants, as the types and possible concentrations of all contaminants at the site are unknown and could be diverse.

7.3 SITE INVESTIGATIONS

The objective of the site investigations is to obtain information that will be used to:

- o characterize the site with regard to its potential hazards, if any, to public health, welfare and the environment;
- o evaluate the need for and extent of remedial actions;

- o assess the feasibility of remedial alternatives.

To accomplish the above objectives, the scope of work of this task will include the following subtask:

1. Acquisition of Permits and Authorizations

2. Site Survey

3. Geophysical Survey

4. Soil Sampling

5. Hydrogeologic Investigation

6. Stream Water and Sediment Sampling

7. Related Laboratory Analytical Work

Procedures to be used for each subtask are detailed in Section 7.5 through Section 7.14.

7.4 SITE SECURITY MEASURES

The site is fenced on three sides and bordered by Peach Island Creek on the fourth. Access to the site can be controlled through the single gate on Paterson Plank Road. No additional access control measures are anticipated at this time. Fence repairs will be performed as necessary to maintain site security. Monitoring well and piezometer security will be provided by locking protective casings.

Control of off-site sediment transport will be provided as necessary using hay bales or other appropriate measures.

7.5 SITE SURVEY AND MAP

7.5.1 Objective

The site survey will consist of property, topographic and grid surveys which will be used to generate a site map detailing property boundaries, topography, roadways, buildings, structures, drainage patterns, and other notable structures associated with the site. In addition, all monitoring wells and piezometers will be surveyed accurately.

7.5.2 Preparatory Activities

The subcontracted surveyor will be contacted prior to initiation of site work to review the scope of work, site conditions and project operations.

7.5.3 Field Equipment

The subcontractor will supply all necessary field equipment to perform the site survey.

7.5.4 Personal Protective Equipment

Protective equipment and clothing required is outlined in the Site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.5.5 Procedures and Site Management

Details of the procedures to be used during the site survey will be specified in the subcontract. The on-site Coordinator will ensure that all tasks are performed in accordance with the subcontract.

7.5.5.1 Site Survey

The subcontractor will perform a survey using appropriate surveying methods and equipment to establish site boundaries. The subcontractor will establish one permanent and as many temporary benchmarks or references as may be required for performance of the survey. Benchmarks or references will be tied to the National Geodetic Vertical Datum (NGVD) and to New Jersey and USGS reference systems.

The subcontractor will establish a 50-foot x 50-foot grid or coordinate system over the entire surface of the site and stake the corners of each grid. This grid system will be used for horizontal control of all field activities and corresponding plans.

7.5.5.2 Site Map

The subcontractor will prepare a base map which will include the site and the surrounding area to a distance of at least 100 feet beyond the property boundaries, including Peach Island Creek. The map will indicate property boundaries, topography, roadways, buildings, structures, drainage patterns, debris mounds, pits, lagoons, tanks, utilities, fences, paved areas, easements, right-of-ways, and any other pertinent features. The map will be prepared at a horizontal scale of one inch equals 20 feet and a vertical contour interval of one foot. A grid and/or coordinate system for the entire site consistent with the grid described under Section 7.5.5.1 will also be included on the map.

7.5.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.5.7 Field Investigation Team

The survey will be performed by a New Jersey licensed surveyor. The field investigation team will consist of the following individuals and/or positions:

- On-Site Coordinator
- On-Site Health and Safety Officer
- Survey team

7.5.8 Schedule

It is estimated that one week will be required for completion of this task.

7.6 GEOPHYSICAL SURVEY

7.6.1 Objective

The objectives of the geophysical survey are to locate buried metal objects (drums, tanks, etc) and estimate the extent of the contaminant plume(s), if any. The geophysical survey will consist of a magnetometer and conductivity survey. Additionally, the geophysical survey data will be used to finalize the locations of borings, monitoring wells, and soil sampling. If the boring data indicate variable stratigraphic conditions at the site, such as the absence of the clay or till strata in one or more borings, the need for a refraction survey to provide additional stratigraphic data will be evaluated in conjunction with the EPA.

7.6.2 Preparatory Activities

The geophysical survey subcontractor will be contacted prior to initiation of site work to review the scope of the work, site conditions and project operations.

Initial activities will include review of site-specific information. This will include regional topographic information and evaluation of site geology and hydrology (both surface and ground water).

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The 50 by 50-foot grid network for the site, established by the surveyor, will be used for horizontal control of the surveys. Specific ground-truthing (excavation pits and/or borings) can then be located quickly and accurately to reference points.

7.6.3 Field Equipment

The subcontractor will supply all necessary equipment to perform the geophysical surveys.

7.6.4 Personal Protective Equipment

Protective equipment and clothing required is outlined in the site Health & Safety Plan (HASP), Appendix B. The on-site Health & Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.6.5 Procedures and Site Management

The geologist/geophysicist will be responsible for ensuring that the proper geophysical surveying techniques and procedures are employed and that they are performed in the specified areas.

Magnetometer equipment will be employed to locate buried metal (debris, drums and tanks). Electromagnetic (terrain conductivity) equipment will be employed to estimate the extent (if present) of contaminant plume(s).

The grid established on site will be used to locate both magnetometer and conductivity stations.

7.6.5.1 Terrain Conductivity

The terrain conductivity survey will employ a Geonics EM-31 or equivalent system which will be operated on a continuous profiling mode. Survey lines will be spaced 20 feet apart. If required, additional lines will be run to acquire additional data. Station locations, grid spacing and profiling lines may be modified in the field if deemed appropriate by the geophysicist.

7.6.5.2 Magnetometer

The magnetometer survey will be run over the entire site and data gathered at 10-foot stations and at all surface anomalies. The magnetometer equipment measures the total intensity of the earth's magnetic field in gammas. Any subsurface ferrous materials affecting the earth's magnetic field appear as anomalies.

7.6.6 Data Interpretation

State-of-the-art interpretation techniques will be used to evaluate the geophysical data so accurate definition of subsurface conditions are made. Following completion of the magnetometry and conductivity surveys and review of boring data, the need for a refraction survey to provide additional stratigraphic data will be evaluated by Dames & Moore and the EPA.

All field data will be plotted daily, so that modifications of the field survey can be made as required to insure that the site program proceeds smoothly. All geophysical data will be referenced to existing points.

The results (raw data, contours, interpretations) of all geophysical surveys will be submitted to the EPA as soon as they become available.

7.6.7 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.6.8 Field Investigation Team

The geophysical survey shall be performed by a qualified geophysical subcontractor. The field investigation team will consist of the following individuals and/or positions:

- On-Site Coordinator
- On-Site Health and Safety Officer
- Geologist/Geophysicist
- Geophysical Survey Team

7.6.9 Schedule

Completion of this task will take approximately three weeks after subcontractor receives notification to proceed.

7.7 PIEZOMETER INSTALLATION

7.7.1 Objective

The objective of this task is to install four shallow piezometers in the upper saturated zone at locations shown on Figure 7-1. The purpose of the piezometers is to supplement ground water elevation data. Additionally, boring logs from the piezometers and chemical analysis of selected soil samples will provide additional information related to subsurface geology and contamination, if any.

The piezometers will be installed prior to the installation of monitoring wells and will be read at least twice daily during subsequent field activities (drilling, well installation and ground water sampling).

7.7.2 Preparatory Activities

The drilling contractor will be contacted prior to initiation of site work to review the scope of work. All permits, licenses, approvals, certificates and authorizations required will be obtained prior to initiation of field activities. The field geologist/engineer will locate and stake boring locations prior to drilling activities. Piezometers will be installed at the approximate locations shown on Figure 7-1. Final determination of piezometer locations will be based upon results of the geophysical surveys.

7.7.3 Field Equipment

Field equipment to be used for this task include some or all of the following:

1. Stainless steel knife, trowel, and spatula.
2. Photoionization detector and/or organic vapor analyzer.

3. Boring logs and sampling record.
4. Decontamination detergents and solvents.
5. Distilled or deionized water.
6. Sample bottles.
7. Stakes and marking flags.
8 Electric water level indicator.
9. Required Health & Safety clothing and equipment.
10. Brushes.

7.7.4 Personal Protective Equipment

Protective equipment and clothing required is outlined in the site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.7.5 Procedures and Site Management

The field geologist/engineer is responsible for the proper installation of piezometers.

7.7.5.1 General Piezometer Installation Procedures

All piezometers will be installed under the supervision of an experienced field geologist/engineer and drilled by a licensed well driller registered in New Jersey.

7.7.5.2 Cleaning

Prior to arriving on site, the drilling contractor will certify that the drill rig, tools and any downhole components or materials have been steam cleaned since their last use. An on-site controlled decontamination area will be selected for cleaning. The lower part of the drill rig and drilling tools will be steam cleaned at the decontamination area before initiating drilling. Steam-cleaning will be done between each boring and at the conclusion of the drilling program at the on-site controlled decontamination area. Rinse water from all on-site decontamination of down-hole drilling tools will be collected and stored in DOT-approved drums on site until final disposition of liquids is determined. Additionally, the driller will clean the water tank and rinse it with potable water prior to drilling the first boring.

7.7.5.3 Drilling Operations

Piezometers will be installed prior to the installation of monitoring wells and in the order of least suspected level of contamination to higher as determined by the geophysical survey results. Vegetable shortening will be used to grease auger and drill rod threads; auger grease is unacceptable. Split-spoon soil samplers will be used for formation sampling. Sampling will be continuous (every 2 feet) to the ground water table. If needed, subsequent sampling will be on a 5-foot interval and/or at major lithologic changes and at design depth.

During drilling operations, a PID or OVA will be used to monitor the airspace directly above the borehole. These readings will be recorded on the boring log corresponding to the depth of penetration.

7.7.5.4 Shallow Piezometer Installation

Shallow piezometers will be 2-inch nominal diameter and constructed of threaded joint PVC. Piezometer screen slot size will be 0.020-inch and screen lengths are expected to be 5 feet. Actual screen length will be determined by the field geologist/engineer.

Screens and riser pipes will be installed in the completed bore holes and the annular space around the piezometer screens will be backfilled with a clean sand pack of 90 percent by weight larger than the screen slot size. The sand pack will extend 1 to 2 feet above the top of the piezometer screen. Measurements will be confirmed with a weighted tape or small diameter pipe.

A bentonite seal, 2-3 feet thick, will be placed in the annular space above the sand pack. Bentonite pellets, 1/4-inch in diameter, will be used to form the seal. Measurements will be confirmed as with the sand pack.

The remainder of the annular space, if any, will be grouted using a cement/bentonite grout. A lockable protective steel casing will be set in a cement collar above the grout.

All piezometer casings will be surveyed to the nearest hundredth (0.01) foot above mean sea level and a permanent mark will be placed on the casing as a reference point for future water level measurements. A permanent piezometer identifier will be placed on the casing.

Piezometer construction will be summarized on the boring log with a detailed sketch.

7.7.5.5 Sampling and Logging

Overburden sampling will be performed using a split-spoon sampler. A representative section of each sample retrieved will be placed in a separate jar and labeled. If a major change in soil type occurs with a sample, each soil type will be placed in a different jar and labeled. The field geologist/engineer will log each sample on the boring log and complete the Chain of Custody Form.

Samples to be analyzed by the laboratory will be split, i.e., a representative section will be selected so that a portion will be placed in the appropriate pre-labeled laboratory container with the remainder to be placed in field sample jars. The proposed sampling scheme is outlined in Table 7-3. Dames & Moore will provide split samples to the EPA's designated representative upon request.

Samples will be removed from the split-spoon by use of a stainless steel knife, spatula or trowel. A scan of the head space air quality from each field sample jar will be taken 10-15 minutes following collection with a photoionization detector and/or an organic vapor analyzer. Results of these scans will be recorded on the boring log.

After each use, split spoon samplers and sampling knives will be cleaned using the following procedure:

1. Wash with a low phosphate detergent.
2. Tap water rinse.
*3. Rinse with 10 percent nitric acid solution.
4. Tap water rinse.
5. Methonal followed by hexane rinse.

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6. Deionized water rinse.

7. Air dry.

* Note: If no metals samples are being taken, the 10 percent nitric acid may be omitted.

7.7.5.6 Water Level Measurement Procedures

Water level measurements will be taken to the nearest 0.01 foot utilizing portable reel-type electronic water level probes. The water level is measured by lowering the electrode until the instrument sounds an audible alarm indicating the tip is in the water. The procedure is as follows:

1. Turn toggle switch to "on" and check battery strength by pressing test button.

2. Identify the installation (piezometer, well) designation and insert probe into desired tube.

3. Lower the probe into the tube by unreeling the tape until audible alarm sounds.

4. Record depth to water directly from the insulated tape read from the reference point on the installation.

7.7.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.7.7 Field Investigation Team

Dames & Moore and its drilling subcontractor will perform all activities associated with the installation of the piezometers. The field investigation team will consist of the following individuals and/or positions:

- On-site Coordinator
- On-site Health & Safety Officer
- Field Geologist/Engineer
- Driller and helper.

7.7.8 Schedule

It is estimated that one week will be required for completion of this subtask following drilling subcontractor's notification to proceed.

7.8 MONITORING WELL INSTALLATION

7.8.1 Objective

The objective of this task is to install ten ground water monitor wells: seven shallow wells and three deep wells. Additionally, water level recorders will be installed on one of the well pairs adjacent to the stream, and a tidal staff will be installed in Peach Island Creek. The purpose of the monitoring wells is to verify the hypothesis that the zone most susceptible to contamination is the shallow surficial zone, while the glacial till and bedrock aquifers are protected by a layer of low permeability lacustrine silty clay, while the water level recorders and tidal staff will be used to investigate the possibility of tidal influence on the aquifer. Boring logs from the wells along with chemical analysis of samples and insitu permeability testing will provide information related to subsurface geology and aquifer characteristics in the area.

The exact order of well installation and location will be based upon the results of the geophysical surveys. Additionally, boring depths may vary as a result of actual stratigraphic conditions. Proposed monitoring well locations are shown in Figure 7-1. The water level recorders will be installed on well pair MW-5S/5D located adjacent to Peach Island Creek on the northern boundary of the site. Continuous measurements will be recorded over a four-week period. Measurements will be correlated to a tidal staff installed in Peach Island Creek adjacent to MW-5S/5D. Water level measurements on the tidal staff will be made on an hourly basis over a full tidal cycle period.

7.8.2 Preparatory Activities

The drilling contractor will be contacted prior to initiation of site work to review the scope of work. The scope will be based on existing knowledge of site hydrogeology and results of the geophysical investigation. All permits, licenses, approvals, certificates and authorizations required will be obtained prior to initiation of field activities. The field geologist/engineer will locate and stake boring locations prior to drilling activities. Monitoring wells will be installed at the approximate locations shown on Figure 7-1. Final determination of well locations will be based upon results of the geophysical surveys.

The water level recorders will be in good working condition. The field geologist/engineer will be familiar with the manufacturer's calibration and installation procedures.

7.8.3 Field Equipment

Field equipment to be used for this task include some or all of the following:

1. Stainless steel knife, trowel, and spatula.
2. Photoionization detector and/or organic vapor analyzer.
3. Boring logs and sampling record.
4. Decontamination detergents and solvents.
5. Distilled or deionized water.
6. Sample bottles.
7. Stakes and marking flags.
8. Electric water level indicator.
9. Required Health & Safety clothing and equipment.
10. Brushes.
11. Submersible and/or centrifugal pump.
12. Water level recorders.
13. Tidal staff.

7.8.4 Personal Protective Equipment

Protective equipment and clothing required is outlined in the site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.8.5 Procedures and Site Management

The field geologist/engineer is responsible for the proper installation of monitoring wells, water level recorders and tidal staff.

7.8.5.1 General Monitoring Well Installation Procedures

All monitoring wells will have an individual state permit and be installed under the supervision of an experienced field geologist/engineer and drilled by a licensed well driller registered in New Jersey. Well installation will be in accordance with NJDEP monitoring well specifications. Monitoring well requirements are listed in Table 7-2. Typical well installations are shown in Figure 7-2.

7.8.5.2 Cleaning

Prior to arriving on site, the drilling contractor will certify that the drill rig, tools and any downhole components or materials have been steam-cleaned since their last use. An on-site controlled decontamination area will be selected for steam-cleaning. The lower part of the drill rig and drilling tools will be steam cleaned at the decontamination area before initiating drilling. Steam-cleaning will be done between each boring and at the conclusion of the drilling program at the on-site controlled decontamination area. Rinse water from all on-site decontamination of down-hole drilling tools will be collected and stored in DOT-approved drums on site until final deposition of liquids is determined. Additionally, the driller will clean the water tank and rinse it with potable water prior to drilling the first boring.

7.8.5.3 Drilling Operations

Wells will be drilled in the order of least suspected level of contamination to higher as determined by the geophysical survey results. Vegetable shortening will be used to grease auger and drill rod threads; auger grease is unacceptable. Split-spoon soil samplers will be used for unconsolidated formation sampling. If necessary, bedrock will be cored continuously up to 10 feet with an NX core barrel.

All deep borings will be sampled continuously (every 2 feet) to top of bedrock. Shallow borings not adjacent to a deep boring will be sampled continuously (every 2 feet) to the ground water table. Subsequent sampling will be on a five-foot interval and/or at major lithologic change until design depth is reached.

During drilling operations, a PID or OVA will be used to monitor the airspace directly above the borehole. These readings will be recorded on the boring log corresponding to the depth of penetration.

7.8.5.4 Monitoring Well Installation

Monitoring wells will be constructed using 4-inch nominal diameter stainless steel. Type 316 stainless steel will be used for the seven shallow wells, while Type 304 stainless steel will be used for the three deep wells, because the chloride content of the lower aquifer is expected to be low (see Reference 3 in Section 3.4). Schedule 5 riser pipe will be used for the upper 50 feet of all wells, and Schedule 40 will be used below 50 feet. Well screen slot size will be 0.020-inch, and the well screen length will be determined by the field geologist/engineer.

Screens and riser pipes will be installed in the completed bore holes and the annular space around the well screens will be backfilled with a clean sand pack of 90 percent by weight larger than the screen slot size. The sand pack will extend 2 to 3 feet above the top of the well screen. Measurements will be confirmed with a weighted tape or small diameter pipe.

A bentonite seal, 2-3 feet thick, will be placed in the annular space above the sand pack. Bentonite pellets, 1/4-inch in diameter, will be used to form the seal. Measurements will be confirmed as with the sand pack.

The remainder of the annular space, if any, will be grouted using a cement/bentonite grout. A lockable protective steel casing will be set in a cement collar placed above the grout.

All well casings will be surveyed to the nearest hundredth (0.01) foot above mean sea level and a permanent mark shall be placed on the casing as a reference point for future water level measurements. A permanent well identifier will be placed on the protective casing.

- Well construction will be summarized on the boring log with a detailed sketch.

7.8.5.5 Screen Locations

The field geologist/engineer will select the well screen intervals based on actual geologic conditions encountered during drilling operations. General guidelines for both shallow and deep monitoring wells are as follows:

a. Shallow Monitoring Wells: Well screens to extend from 2 feet above the static water level to either 8 feet below the static water level or the top of the clay layer, whichever occurs first.

b. Deep Monitoring Wells: Well screens to extend from 2 feet into the bedrock to either the top of the glacial till layer or a maximum screen length of 15 feet, whichever occurs first. If either the clay or till are absent, the screen will be placed in the upper 10 feet of bedrock.

7.8.5.6 Sampling and Logging

Overburden sampling will be performed using a split-spoon sampler. A representative section of each sample retrieved will be placed in a separate jar and labeled. If a major change in soil type occurs with a sample, each soil type will be placed in a different jar and labeled. The field geologist/engineer will log each sample on the boring log and complete the Chain of Custody Form.

Samples to be analyzed by the laboratory will be split, i.e., a representative section will be selected so that a portion will be placed in the appropriate pre-labeled laboratory container with the remainder to be placed in field sample jars. The proposed sampling scheme is outlined in Table 7-3. Dames & Moore will provide split samples to the EPA's designated representative upon request.

Samples will be removed from the split-spoon by use of a stainless steel knife, spatula or trowel. A scan of the head space air quality from each field sample jar will be taken 10-15 minutes following collection with a photoionization detector and/or an organic vapor analyzer. Results of these scans will be recorded on the boring log and be used as a guide for collection of the most contaminated samples.

- After each use, the sampler will be cleaned using the following procedure:

1. Wash with a low phosphate detergent.
2. Tap water rinse.
*3. Rinse with 10 percent nitric acid solution.
4. Tap water rinse.
5. Methonal followed by hexane rinse.
6. Deionized water rinse.
7. Air dry.

* Note: If no metals samples are being taken, the 10 percent nitric acid may be omitted.

7.8.5.7 Development and Testing of Monitoring Wells

<u>Well Development</u>

Each well will be developed after completion of installation for approximately 1 hour using a submersible pump for the deep wells and a centrifugal pump for the shallow wells.

The discharge rate during development should be estimated by using a 5-gallon bucket and a stop watch. Development should be continued until all but a trace amount of fines and suspended solids are visible in the discharge water. All development water will be diverted away from Peach Island Creek.

<u>Well Testing</u>

In-situ permeability testing will be performed in each of the seven shallow monitoring wells to estimate the permeability of the upper saturated zone. These data will be used in conjunction with the water levels and hydraulic gradients to estimate geohydrologic conditions at the site.

The method of well testing will be based upon the well production capability as determined by discharge rates during well development. Methods which may be used are 1) slug tests and 2) injection test.

A slug test will be performed by introducing a cylindrical "slug" of known volume into the well. The water level is periodically monitored until initial static water level is reached. Slug tests will be performed after well development.

If necessary, an injection test will be performed by pumping water into the well at a known constant rate. Water levels will be monitored periodically until the well equilibrates. Injection tests will be performed after water samples are collected to avoid dilution of actual contaminant concentrations, if any, in the ground water.

7.8.5.8 Water Level Recorder Installation

Water level recorders will be calibrated and installed in strict accordance with the manufacturer's instructions. The field geologist/engineer will perform a pre-operational check on the recorder prior to installation. If needed, provisions shall be made to prevent damage to the recorder.

Water level recorder and tidal staff installations will be summarized with detailed notes and sketches.

7.8.5.9 Water Level Measurement Procedures

Water level measurements will be taken to the nearest 0.01 foot utilizing portable reel-type electronic water level probes. The water level is measured by lowering the electrode until the instrument sounds an audible alarm indicating the tip is in the water. The procedure is as follows:

1. Turn toggle switch to "on" and check battery strength by pressing test button.

2. Identify the installation (piezometer, well) designation and insert probe into desired tube.

3. Lower the probe into the tube by unreeling the tape until audible alarm sounds.

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4. Record depth to water directly from the insulated tape read from the reference point on the installation.

7.8.5.10 Permeability Testing of Clay Layer

In order to determine the permeability of the hypothesized clay layer beneath the site, laboratory permeability tests will be conducted on one to two samples (depending on clay layer thickness) collected from each of the deep monitoring wells. Relatively undisturbed samples of the clay layer will be collected using a thin-wall Shelby tube. These samples will then be delivered to the Dames & Moore laboratory where falling-head permeability tests will be conducted.

7.8.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.8.7 Field Investigation Team

Dames & Moore and its well-drilling subcontractor will perform all activities associated with the installation of the monitoring wells. The field investigation team will consist of the following individuals and/or positions:

- On-site Coordinator
- On-site Health & Safety Officer
- Field Geologist/Engineer
- Driller and helper.

7.8.8 Schedule

It is estimated that three weeks will be required for completion of this subtask following drilling subcontractor notification to proceed.

7.9 GROUND WATER SAMPLING

7.9.1 Objective

The objective of the ground water sampling program is to collect representative samples from the newly-installed monitoring wells at the SCP Site. Chemical analysis of the ground water samples will provide information that will be used to characterize the site with regard to its potential hazard to the public health or the environment, if any, and aid in defining the location and extent of the contaminant plume, if any.

Ground water samples from the 10 monitoring wells will be collected in two rounds: the first round will be collected 14 days following the installation and development of the wells; the second round will be collected after the analytical results of the first round samples are available (approximately eight weeks). The proposed analytical program is illustrated in Table 7-4.

7.9.2 Preparatory Activities

The on-site Coordinator will ensure the following:

- Sample locations have been identified,
- Necessary pre-mobilization arrangements with the laboratory have been made,
- Field equipment is operational; sample equipment is pre-cleaned, and
- Monitoring wells have been properly developed.

7.9.3 Field Equipment

Equipment to be used in this task may include some or all of the following:

1. Electric water level indicator
2. Plastic buckets, 1, 3, and 5-gallon
3. Photoionization detector and/or organic vapor analyzer
4. Field Sampling Records
5. Well keys and gate keys

6. Stainless steel or teflon bailers with bottom-check valve
7. Ice or freezer packs
8. Polyethylene drop cloths
9. Paper towels
10. Distilled or deionized water
11. Cleaning solvents
12. Generator
13. Gas can
14. Submersible and/or centrifugal pump
15. pH meter, conductivity meter, temperature probe or thermometer
16. Rinse bottles
17. Collection can/tub

7.9.4 Personal Protective Equipment

Protective equipment and clothing required is outlined in the Site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.9.4.1 Air Quality Monitoring

The purpose of air quality monitoring during ground-water sampling, in addition to health and safety purposes, is to detect possible air-borne contaminants which may affect the sample quality as well as volatiles leaving the well.

Prior to sampling, air quality monitoring will be performed with a photoionization detector and/or an organic vapor analyzer. This will include monitoring upwind of the well, downwind, and at the well. Readings will be recorded on the Field Sampling Record (Figure 7-4).

7.9.5 Procedures and Site Management

The on-site Coordinator is responsible for the ground water sampling task. The analytical laboratory will provide the sample containers with the shipping containers (shuttles). Containers, and any preservation chemicals added to the containers, will be in accordance with EPA protocols (Appendix E). Dames & Moore will provide split samples to the EPA's designated representative upon request.

The following outlines monitoring well sampling procedures:

1. Measure to 0.01 ft and record the static water level in the well with an electric water-level indicator. Rinse off the indicator probe with distilled water after each use to avoid cross contamination between wells.

2. Open the sample-bottle shuttle from the laboratory and inspect the bottles to make sure all the required bottles are present and labeled.

3. Attach the dedicated polyethylene suction hose for the well to the submersible pump. Lower pump into the well so that foot valve is approximately opposite the middle of the well screen.

4. Pump out a minimum of three well volumes.

5. The purged water will be discharged to the ground surface, ensuring that the water is diverted away from Peach Island Creek.

6. Remove pump and suction hose from well and disconnect suction hose from the pump. Store suction hose in its labeled bag.

7. A dedicated pre-cleaned stainless steel or teflon bailer, with its own attached dedicated length of monofilament polypropylene line, will be used for each well, and is to be stored in separate labeled, heavy duty aluminum foil (shiny side out).

8. Remove the bailer and line from the foil and lower it slowly down into the well by means of the dedicated length of monofilament polypropylene line. A reel may be used to hold the line, or the line may be lowered and raised by hand with the slack portion of the line left to lie in a clean large cardboard box placed next to the well. The bailer should be lowered until it is approximately opposite the well screen. At the completion of the sampling of a well, the bailer and line should be completely rinsed with distilled water. For each well sampled, the bailer should be handled with a new pair of disposable plastic surgical gloves. Water samples should be carefully transferred from the bailer to the sample bottles to minimize the

potential for aeration of the sample, especially those designated for volatile organics analysis (VOA). No head space in the VOA sample bottles is allowed, so special care must be taken in filling and capping these bottles.

10. Make sure that all sample bottle caps are on snugly, but take care not to overtighten them.

11. Label the sample bottles, being sure to include: sample number and type, the name of the sample taker, the date and time, the owner, the name of the site, the well number, the depth at which the sample was taken, analysis required, sample volume, and preservatives added, if any.

12. Complete the Field Sampling Record (Figure 7-4).

13. Pack the sample bottles in the shuttle with ice.

14. Complete the Chain of Custody Form from the laboratory.

15. Seal the shuttle.

16. Store the shuttle in a cool location for temporary storage before transport.

17. Collect an additional sample for field tests. Perform the following field tests: pH, conductivity and temperature. Record results.

18. Lock well caps.

19. Deliver the shuttle to the laboratory within 24 hours.

Both a filtered and unfiltered metals sample will be collected from each monitoring well. The filtered sample will be field-filtered through a 0.45 um membrane filter. Sample will be discharged directly through the filtering apparatus into the container prepared by the laboratory for heavy metal samples.

All equipment used in collecting the sample which may be used in subsequent wells will be cleaned prior to reuse by the following procedure:

1. Wash with a low phosphate detergent.
2. Tap water rinse.
*3. Rinse with 10 percent nitric acid solution.
4. Tap water rinse.
5. Methonal followed by hexane rinse.
6. Deionized water rinse.
7. Air dry.

* Note: If no metals samples are being taken, the 10 percent nitric acid may be omitted.

Only the exterior of the submersible pump will be cleaned with solvents. The inside of the pump will be cleaned by pumping a detergent solution through the pump followed by distilled water. Bailers, hoses, tubing and monofilament polyline will be dedicated to each well.

7.9.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.9.7 Field Investigation Team

Dames & Moore will collect the ground water samples. The sampling team will consist of the following individuals and/or positions:

- On-Site Coordinator
- On-Site Health and Safety Officer
- Field Technician(s)

7.9.8 Schedule

It is estimated that two days will be required to collect a set of samples from the 10 monitoring wells.

7.9.9 Sample Container and Preservation

The laboratory will prepare all sample containers for ground water samples. Recommended containerization and preservation for the various parameters is listed in Appendix E.

7.9.10 Sample Control

Sample control procedures are addressed in Section 8.0 of the POP.

7.9.11 Quality Assurance

Quality Assurance and Quality Control measures are addressed in Section 6 and 8 through 16 of the POP.

7.10 SURFACE WATER AND SEDIMENT SAMPLING

7.10.1 Objective

The objective of the surface water and sediment sampling task is to provide quantitative data on the potential contamination of the Peach Island Creek water and sediments.

Two rounds of stream water samples will be collected. Each round will consist of four samples collected at stations located approximately 150 feet upstream and downstream of the site boundaries, one station approximately at the mid-point of the site, and one station at the confluence of Peach Island Creek and Berrys Creek (Figure 7-3).

To minimize interference from Berrys Creek, both rounds of surface water samples will be collected during a period of low tide. To minimize interference and dilution from surface runoff, one round of samples will be collected during a period of low stream flow. The second round of samples will be collected immediately following a storm to evaluate whether surface runoff from the site is contributing to any contamination of the Creek. The proposed analytical program is illustrated in Table 7-4.

One round of sediment samples will be collected at the same locations and at the same time as the Round 1 stream water samples. Two sediment samples will be collected from each location: one from a depth of 0-6 inches, and one from a depth of 12-18 inches.

7.10.2 Preparatory Activities

- o The on-site Coordinator will ensure that appropriate sample locations have been identified.
- o Necessary pre-mobilization arrangements have been made with the laboratory.
- o Method of over-night delivery of samples to laboratory is known.
- o Field equipment is operational; sample equipment is pre-cleaned.

7.10.3 Field Equipment

Equipment to be used in this task include some or all of the following:

1. Glass collection bottle (provided by laboratory)
2. Field Sampling Record
3. Ice or freezer packs
4. Decontamination detergents and solvents
5. pH meter, conductivity meter, temperature probe or thermometer
6. Stainless steel piston or core sampler, or corers having removable Teflon or glass liners
7. Distilled or deionized water
8. Small boat, flotation jackets, and associated equipment (if necessary) or hip waders.

7.10.4 Personal Protective Equipment

Protective equipment and clothing required is outlined in the Site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.10.5 Procedures and Site Management

The on-site Coordinator is responsible for the surface water and sediment sampling task. The laboratory will provide the required sample containers with the shipping containers (shuttles). Containers, and any preservation chemicals added to the containers, will be in accordance with EPA protocols as listed in Appendix E. Dames & Moore will provide split samples to the EPA's designated representative upon request.

The general order of sampling will be from the sampling point furthest downstream to the furthest upstream point. This order of sampling will reduce disturbance to subsequent samples.

Stream characteristics (depth, width, flow direction and rate, odor, color, etc.) should be noted on the sampling record. Additionally, weather conditions and unusual occurrences will be recorded.

7.10.5.1 Surface Water Sampling

1. Don a new pair of surgical gloves and approach the sampling location facing upstream. Sample will be taken upstream of the position the sampler occupies. Sample should be taken at a point of sufficient depth to allow complete immersion of the collection bottle without collecting bottom sediments, as close to mid-depth and mid-stream as possible.

2. Invert the collection bottle and immerse to mid-depth. Slowly tilt the collection bottle and allow to fill.

3. Remove the collection bottle and transfer sample to sample bottles. The sample bottles will contain the appropriate preservative. VOA bottles will be completely filled allowing no head space or air bubbles. Care should be taken to ensure that sample containers with preservatives are not overflowed. Metal samples will be collected in both a filtered and unfiltered state. The sample to be filtered will be transferred from the collection vessel through the field filtering apparatus, with a 0.45 um membrane filter, and then directly to the sample container.

4. Replace bottle caps snugly, do not overtighten. Label the sample bottles. Include the following: sample number and type, sampler name, date and time, owner, site name, sample location, sample number, sample volume, analysis required, and preservatives added.

5. Place the sample containers in the shipping container with ice or freezer packs to maintain sample at $4^{o}C$. Complete the Chain of Custody Form.

6. After sample containers have been properly filled, labelled, and stored, collect an additional sample for field test. Perform field test and record pH, conductivity, and temperature. Rinse probes with distilled water between tests. Complete the Field Sampling Record (Figure 7-5).

7. Clean collection jar and other equipment in contact with sample using the following procedure:

   a. Wash with a low phosphate detergent.
   b. Tap water rinse.
   *c. Rinse with 10 percent nitric acid solution.
   d. Tap water rinse.
   e. Methonal followed by hexane rinse.
   f. Deionized water rinse.
   g. Air dry.

   * Note: If no metals samples are being taken, the 10 percent nitric acid may be omitted.

8. If sediment sample is needed, collect sample as outlined in 7.10.5.2.

9. Discard surgical gloves and move to next sampling point.

7.10.5.2 Sediment Sampling

1. Don a new pair of surgical gloves. Sample will be taken upstream of the position the sampler occupies.

2. Sediment samples will be collected from the stream bed using a stainless steel piston or core sampler, or corers having removable Teflon or glass inner liners.

3. Exercise care to avoid losing the fine materials which tend to disperse when disturbed. Native water on top of the final sample should not be removed.

4. Remove and discard rocks and vegetative material in the sample.

5. Completely fill the sample jar, cap and label the jar.

6. Place the sample containers in the shipping container with ice or freezer packs to maintain sample at $4^{o}C$. Complete the Chain of Custody Form.

7. Complete the Field Sampling Record.

8. Clean collection equipment using the following procedure:

   a. Wash with a low phosphate detergent.
   b. Tap water rinse.
   *c. Rinse with 10 percent nitric acid solution.
   d. Tap water rinse.
   e. Methonal followed by hexane rinse.
   f. Deionized water rinse.
   g. Air dry.

   * Note: If no metals samples are being taken, the 10 percent nitric acid may be omitted.

9. Discard surgical gloves and move to next sampling point.

7.10.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.10.7 Field Investigation Team

Dames & Moore will collect the surface water and sediment samples. The sampling team will consist of the following individuals and/or positions:

- On-Site Coordinator
- On-Site Health and Safety Officer
- Field Technician(s)

7.10.8 Schedule

Surface water and sediment sampling will be scheduled to coincide with the ground water sampling effort to the extent practical. If surface water flow is high during ground-water sampling, surface water and sediment sampling may be postponed until flows have decreased.

7.10.9 Sample Container and Preservation

The laboratory will prepare all sample containers for surface water and sediment samples. Recommended containerization and preservation for the various parameters are listed in Appendix E.

7.10.10 Sample Control

Sample control procedures are addressed in Section 8.0 of the POP.

7.10.11 Quality Assurance and Quality Control

Quality assurance and quality control measures are addressed in Section 6 and 8 through 16 of the POP.

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7.11 SOIL SAMPLING

7.11.1 Objective

The objective of the task is to collect soil samples for chemical analysis to determine the extent of soil contamination, if any. Additionally, soil samples collected from borings will provide information related to the stratigraphy of the site.

Soil samples for stratigraphic correlation and chemical analyses will be collected at 17 locations throughout the site (Figure 7-1). Most soil samples will be collected in the monitoring well and piezometer borings (Table 7-3). Test pits or shallow hand-augered borings will be used to obtain samples at locations where borings for piezometers or monitoring wells will not be drilled. All shallow monitoring well and piezometer borings will be sampled continuously (every 2 feet) to the ground water table. If needed, subsequent sampling will be on a five-foot interval and/or at every major lithologic change and at design depth. Deep monitoring well borings will be sampled continuously to the top of the bedrock.

A total of 57 soil samples will be collected for chemical analysis at various locations and depths throughout the site (Table 7-4). A total of 51 samples will be collected from the unsaturated zone. The remaining six samples will be collected from the saturated zone. Soil sampling for chemical analysis is described in more detail below.

7.11.2 Preparatory Activities

The on-site Coordinator will ensure the following:

- sample locations have been identified,
- necessary premobilization arrangements with the drilling contractor and laboratory have been made,
- method of overnight delivery of samples to laboratory is known, and
- sampling equipment has been decontaminated and pre-cleaned.

7.11.3 Field Equipment

Equipment to be used in this task include some or all of the following:

1. Field Sampling Record
2. Photoionization detector and/or organic vapor analyzer
3. Shovel, hand auger, post-hole digger
4. Stainless steel knife, trowels, spoons, and scoops
5. Distilled or deionized water
6. Cleaning detergents and solvents
7. Ice or freezer packs

7.11.4 Personal Protective Equipment

Protective equipment and clothing required is outlined in the site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.11.5 Procedures and Site Management

The on-site Coordinator and/or the field geologist/engineer is responsible for the soil sampling task. The laboratory will provide the necessary sample containers with the shipping containers (shuttles). Containers, and any preservatives added to the containers, will be in accordance with EPA protocols as listed in Appendix E. Dames & Moore will provide split samples to the EPA's designated representative upon request.

7.11.5.1 Samples Collected from Monitoring Well and Piezometer Borings

Procedures for collecting soil samples from piezometer and monitoring well borings are discussed in Sections 7.7.5.5 and 7.8.5.6, respectively. Proposed sampling depths are shown in Table 7-3.

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7.11.5.2 Samples from Test Pits or Hand Augers

Three samples will be taken from each test pit or hand auger location (Figure 7-1). The first sample will be collected at the depth interval of 0-1 foot (0.5 to 1.0 foot for VOC). The second sample will be collected at the depth interval of 2-3 feet. The third sample will be collected at the depth interval of 4-5 feet or approximately one foot above the ground water table, whichever is greater. Excavation will be performed using either a hand auger or test pit as conditions dictate. In the case of hand-augered excavations, it may be necessary to use a split-spoon to collect the sample. Prior to use, the split-spoon will be cleaned following the procedure set forth in Step 7 below. The split-spoon may be hand driven to collect the sample. The sample should be taken from the mid-section of the spilt-spoon.

The following procedures outline the method of sampling:

1. Don a new pair of surgical gloves. Advance the excavation to the desired sampling depth with a stainless steel spoon or scoop. Obtain a soil sample using a stainless steel spoon or scoop from the undisturbed soil at the bottom of the excavation.

2. Place the collected sample into the appropriate sample container. Sample will be of sufficient material to fill containers provided by the laboratory.

3. Cap and label the sample container.

4. Within 10-15 minutes, scan the sample jar head space with a PID and/or OVA and record readings. Complete the Field Sampling Record.

5. Place sample container in shuttle with ice. Complete the Chain of Custody Form.

6. Clean and decontaminate the stainless steel spoon or scoop using the following procedure:

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a. Wash with a low phosphate detergent.

b. Tap water rinse.

*c. Rinse with 10 percent nitric acid solution.

d. Tap water rinse.

e. Methonal followed by hexane rinse.

f. Deionized water rinse.

g. Air dry.

* Note: If no metals samples are being taken, the 10 percent nitric acid may be omitted.

7. Advance the excavation to approximately 6 inches above the second sampling depth. Monitor removed soil with a PID and/or OVA.

8. Collect sample as in Steps 1 through 6 above.

9. Clean and decontaminate all equipment after the completion of each test-pit or boring as in Step 6.

10. Backfill each test pit/boring with removed soils..

7.11.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.11.7 Field Investigation Team

Dames & Moore will collect all soil samples. The sampling team will consist of the following individuals and/or positions:

- On-Site Coordinator
- On-Site Health and Safety Officer
- Field Technician(s)

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7.11.8 Schedule

Soil sampling will be performed concurrently with drilling operations and ground water sampling.

7.11.9 Sample Container and Preservation

The laboratory will prepare all sample containers for soil samples. Recommended containerization and preservation for the various parameters are listed in Appendix E.

7.11.10 Sample Control

Sample control procdures are addressed in Section 8.0 of the POP.

7.11.11 Quality Assurance

Quality assurance and quality control measures are addressed in Section 6.0 and 8.0 through 16.0 of the POP.

7.12 GROUND WATER SEEPS

7.12.1 Objective

The objective of this task is to collect samples of ground water seeps discharging into Peach Island Creek (Figure 7-3). If present during the field investigations, these seeps will be sampled twice, if feasible, at low tide, when there is no surface runoff from a recent rainfall event. The samples will be analyzed for the same parameters as the monitoring well samples (Table 7-4).

7.12.2 Preparatory Activities

- o The on-site Coordinator shall locate and verify the presence of groundwater seeps.
- o Necessary premobilization arrangements have been made with the laboratory.
- o Method of delivery of samples to laboratory is known.
- o Field equipment is operational; sampling equipment is pre-cleaned following procedure set forth in Section 7.12.5, Step 6.

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7.12.3 Field Equipment

Equipment to be used in this task include some or all of the following:

1. Glass collection bottle (provided by laboratory)
2. Field Sampling Record
3. Ice or freezer packs
4. Decontamination detergents and solvents
5. Distilled or deionized water
6. pH meter, conductivity meter, temperature probe or thermometer.

7.12.4 Personal Protection Equipment

Protective equipment and clothing required is outlined in the Site Health and Safety Plan (HASP), Appendix B. The on-site Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.12.5 Procedures and Site Management

The on-site Coordinator is responsible for the ground water seep sampling task. The laboratory will provide the required sample containers with the shipping containers (shuttles), containers, and any preservatives added to the containers, will be in accordance with EPA protocols as listed in Appendix E. Dames & Moore will provide split samples to the EPA's designated representative upon request.

The following procedures outline the method of sampling ground water seeps:

1. Don a new pair of surgical gloves.

2. Collect sample in collection jar and transfer to appropriate sample containers. Actual conditions will dictate the exact method of collecting the ground-water seeps. In general, the water samples will be collected by either immersing the collection jar into a pool formed by a natural or man-made impoundment. Poly sheeting will be used to avoid contacting the collection jar with surface soils. Aluminum foil (shiny side down) may be used to form an impoundment. VOA bottles will be completely filled allowing no head space or air bubbles. Care should be taken to ensure that

sample containers with preservatives are not overflowed. Metal samples will be collected in both a filtered and unfiltered state. The sample to be filtered will be transferred from the collection vessel through the field filtering apparatus with a 0.45 um membrane filter and then directly to the sample container.

3. Replace bottle caps snugly, do not overtighten. Label the sample bottles. Include the following: sample number and type, sampler name, date and time, owner, site name, sample location, sample volume and preservatives added, if any.

4. Place the sample containers in the shipping container with ice or freezer packs to maintain sample at 4°C. Complete the Chain of Custody Form.

5. After sample containers have been properly filled, labeled, and stored, collect an additional sample for field tests. Perform field tests and record pH, conductivity, and temperature. Rinse probes with distilled water between tests. Complete the Field Sampling Record (Figure 7-5).

6. Clean collection jar and other equipment in contact with sample will be cleaned using the following procedure:

   a. Wash with a low phosphate detergent.
   b. Tap water rinse.
   *c. Rinse with 10 percent nitric acid solution.
   d. Tap water rinse.
   e. Methonal followed by hexane rinse.
   f. Deionized water rinse.
   g. Air dry.

   * Note: If no metals samples are being taken, the 10 percent nitric acid may be omitted.

7. Discard surgical gloves.

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7.12.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.12.7 Field Investigation Team

Dames & Moore will collect the samples from ground water seeps. The sampling team will consist of the following individuals and/or positions:

- On-Site Coordinator
- On-Site Health and Safety officer
- Field technician(s)

7.12.8 Schedule

Ground-water seeps are scheduled to be sampled during the ground water sampling effort.

7.12.9 Sample Container and Preservation

The laboratory will prepare all sample containers for ground water seep samples. Recommended containerization and preservation for the various parameters are listed in Appendix E.

7.12.10 Sample Control

Sample control procedures are addressed in Section 8 of the POP.

7.12.11 Quality Assurance

Quality assurance and quality control measures are addressed in Section 6 and 8 through 16 of the POP.

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7.13 UNDERGROUND PIPES AND TANKS

7.13.1 Objective

The objective of this task is to visually locate the pipe(s) exposed along the bank of Peach Island Creek (as reported by NJDEP) and sample the discharge, if any. Discharge will be analyzed for the same parameters as monitoring well samples (Table 7-4).

In addition, any underground pipes and/or tanks identified by means of the geophysical surveys will be brought to the attention of the EPA, and the need for additional sampling requirements will be evaluated at that time.

7.13.2 Preparatory Activities

- o The on-site Coordinator shall locate the exposed pipe and verify discharge.
- o Necessary pre-mobilization arrangements have been made with the laboratory.
- o Method of overnight delivery of samples to laboratory is known.
- o Field equipment is operational, sampling equipment precleaned.

7.13.3 Field Equipment

Equipment to be used in this task include some or all of the following:

1. Glass collection bottle (provided by laboratory)
2. Field sampling record
3. Ice or freezer packs
4. Decontamination detergents and solvents
5. Distilled or deionized water
6. pH meter, conductivity meter, temperature probe or thermometer.

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7.13.4 Personal Protection Equipment

Protective equipment and clothing required is outlined in the Site Health and Safety Plan (HASP), Appendix B. The onsite Health and Safety Officer will be responsible for ensuring that the HASP is adhered to.

7.13.5 Procedures and Site Management

The on-site Coordinator is responsible for the sampling of underground pipe discharge. The laboratory will provide the required sample containers with the shipping containers (shuttles). Containers and any preservatives added to the containers, will be in accordance with EPA protocols as listed in Appendix E. Dames & Moore will provide split samples to the EPA's designated representative upon request.

Procedures for sample collection is the same as those for ground water seeps (Section 7.12.5). Additionally, the location of the exposed pipe, size, and estimate discharge rate will be noted on the sampling record.

7.13.6 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.13.7 Field Investigation Team

Dames & Moore will collect the underground pipe discharge samples. The sampling team will consist of the following individuals and/or positions:

- o On-Site Coordinator
- o On-Site Health and Safety Officer
- o Field Technician(s)

7.13.8 Schedule

Underground pipe discharge sampling will be scheduled to coincide with the ground water sampling effort.

7.13.9 Sample Container and Preservation

The laboratory will prepare all sample containers for underground pipe discharge samples. Recommended containerization and preservation for the various parameters are listed in Appendix E..

7.13.10 Sample Control

Sample control procedures are addressed in Section 8 of the POP.

7.13.11 Quality Assurance

Quality Assurance and quality control measures are addressed in Section 6 and 8 through 16 of the POP.

7.14 AIR MONITORING

7.14.1 Objective

Air monitoring at the SCP site will be performed to ensure safe working conditions throughout the field investigation, especially during ground intrusive activities. A wind direction indicator will be visible to field personnel during all field activities. Monitoring instrumentation will consist of a photoionization detector (PID) and/or an organic vapor analyzer (OVA), select detector tubes (chloroform and carbon tetrachloride), and an explosimeter or combustible gas indicator (CGI).

7.14.2 Preparatory Activities

The on-site Health and Safety Officer will ensure that all air monitoring instruments are functional and calibrated and are used correctly.

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7.14.3 Field Equipment

Field equipment to be used includes:

1. Photoionization detector (PID) and/or OrganicVapor Analyzer (OVA)
2. Explosimeter or combustible gas indicator (CGI)
3. Calibration equipment

7.14.4 Procedures and Site Management

The on-site Health and Safety Officer is responsible for the proper use of the air monitorng instrumentation. Detailed operational procedures for each instrument are in the Health and Safety Plan, Appendix B.

Monitoring will be conducted throughout the field investigation. Monitoring will be conducted during, but not limited to, drilling activities, soil sampling, and ground-water sampling.

Elevated readings and actions taken will be noted on the boring log or sampling record. Additionally, locations of elevated readings will be noted on the site map. All monitoring information gathered will be submited to the EPA in the Draft RI Report.

7.14.5 Health and Safety Guidelines

Health and Safety Guidelines are outlined in the HASP, Appendix B. The on-site Health and Safety Officer will be responsible to ensure that these guidelines are followed.

7.14.6 Field Investigation Team

Dames & Moore personnel will conduct all air monitoring. The team will consist of the following individuals and/or positions.

- On-Site Coordinator
- On-Site Health and Safety Officer
- Field Geologist/Engineer
- Field Technician(s)

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7.14.7 Schedule

Air monitoring will be conducted throughout the field investigation.

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TABLE 7-1

POLLUTANT CONCENTRATIONS FOUND IN SAMPLES

COLLECTED AT SCP SITE, CARLSTADT, NEW JERSEY

Substance	Sludge Floating on Peach Island Creek (ppb)	Sludge on Creek Ice* (ppm)	Spills Near Thin-Film Evaporator (ppm)
Benzene	42	5.0	650
Chloroform	250	—	—
Methyl Ethyl Ketone	—	52.0	800
Styrene	—	4.0	50
Tetrachloroethylene	45	12.0	200
Toluene	1,250	8.8	1,800
Trichloroethane	—	4.3	400
Trichloroethylene	200	26.0	400
m-xylene	420	8.4	210
o-xylene	175	1.16	66

*Peach Island creek Partially Frozen Over.

Source: Cahayla-Wynne and Tan, January 19, 1979, in Reference 1.

TABLE 7-2

NJDEP Monitoring Well Requirements

1. Notification to the NJDEP is required two (2) weeks prior to drilling.

2. State well permits are required for each monitor well constructed by the driler. Report "use of well" on well permit application. Permit number must be permanently affixed to each monitor well.

3. The borehole must be a minimum of four (4) inches greater than the casing diameter. The outer steel casing must be securely set and grouted into the confining layer (if present), depth field determined unless specified in diagram, before drilling continues through that layer.

4. Wells must be gravel packed unless noted otherwise in Additional Requirement #8.

5. Approved high grade sodium base, well sealant type, granular bentonite must be used to seal casing. Casing sealant and drilling fluids must be mixed with potable water.

6. All wells must be developed upon completion for a minimum of one (1) hour or to yield of turbid-free discharge.

7. The driller must maintain an accurate written log of all materials encountered in each hole, record all construction details for each well, the static water levels, and any tidal fluctuations (when applicable). This information must be submitted to the Office of Water Allocation as required by N.J.S.A. 58:4A.

8. If low level organic compounds are to be sampled for, only threaded or press joints (no glue joints) are acceptable.

9. A length of steel casing with a locking cap must be securely set in cement a minimum of three (3) feet below ground surface.

10. Top of the casing (excluding cap) must be surveyed to the nearest hundreth foot (0.01) by a licensed surveyor. The casing must be permanently marked at the point surveyed. The well(s) should be numbered clearly on the casing. A detailed site map with the well locations and casing elevations must be submitted to EPA and NJDEP.

11. NOTICE IS HEREBY GIVEN OF THE FOLLOWING:

    a. Review by the Department of well locations and depths is limited solely to review for compliance with the law and Department rules;

    b. The Department does not review well locations or depths to ascertain the presence of, nor the potential for, damage to any pipeline, cable or other structure;

    c. The permittee (applicant) is solely responsible for safety and adequacy of the design and construction of wells required to be constructed by the Department;

TABLE 7-4

SUMMARY OF ANALYTICAL PROGRAM

	SOIL							GROUND WATER				STREAM			
	3 DEEP WELLS	4 SHALLOW WELLS	4 PIEZOMETERS	SLUDGE PIT	TANK FARM	ADDITIONAL LOCATIONS (4)		WELLS-ROUND I	WELLS-ROUND II	GROUND WATER SEEPS (2 ROUNDS)		WATER (2 ROUNDS)	SEDIMENT		TOTAL
NUMBER OF SAMPLES	15	12	12	3	3	12		10	10	4		8	8		97
PRIORITY POLLUTANTS MEK, STYRENE, M-XYLENE, O-XYLENE	●	●	●	●	●	●		●	●	●		●	●		97
PETROLEUM HYDROCARBONS	●	●	●	●	●	●		●	●	●		●	●		97
pH								●	●	●		●			32
ACIDITY/ALKALINITY								●	●	●		●			32
SPECIFIC CONDUCTANCE								●	●	●		●			32

NOTES:

1). ROUND II WATER SAMPLES WILL BE ANALYZED FOR TARGETED PARAMETERS FOLLOWING REVIEW OF ROUND I SAMPLING RESULTS AND DISCUSSION WITH EPA.

2). pH AND SPECIFIC CONDUCTANCE WILL BE MEASURED IN THE FIELD.

3). FOR LISTING OF PRIORITY POLLUTANTS SEE TABLE 10-2.

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TABLE 7-2
(continued)

d. The permittee (applicant) is solely responsible for any harm or damage to person or property which results from the construction or maintenance of any well; this provision is not intended to relieve third parties of any liabilities or responsibilities which are legally theirs.

ADDITIONAL REQUIREMENTS (if specified by NJDEP)

1. Top of Screen Set at ____ feet above/below water table
2. Split Spoon Samples at Every 5 feet or Change in Lithology
3. Dedicated Boiler (Sampler) in Well(s)
4. Threaded or Press Joints (no glued joints)
5. Five (5) Foot Casing Tailpiece Below Screen
6. Centralizers On Screen
7. Borehole Geophysical Log(s)
8. Other

*OTHER MATERIALS, DESIGNS AND CASING DIAMETERS MAY BE USED WITH PRIOR APPROVAL BY THE NJDEP.

ACCEPTABLE GROUTS (NJDEP Division of Water Resources)

a. Cement and 5% Bentonite — Maximum of 8 gallons of potable water per 94 lb. bag of bentonite (5%).

b. Cement and 10% Bentonite — Maximum of 10 gallons of potable water per 94 lb. bag of bentonite (10%).

c. Neat Cement — Maximum of 6 gallons of potable water per 94 lb. bag of bentonite.

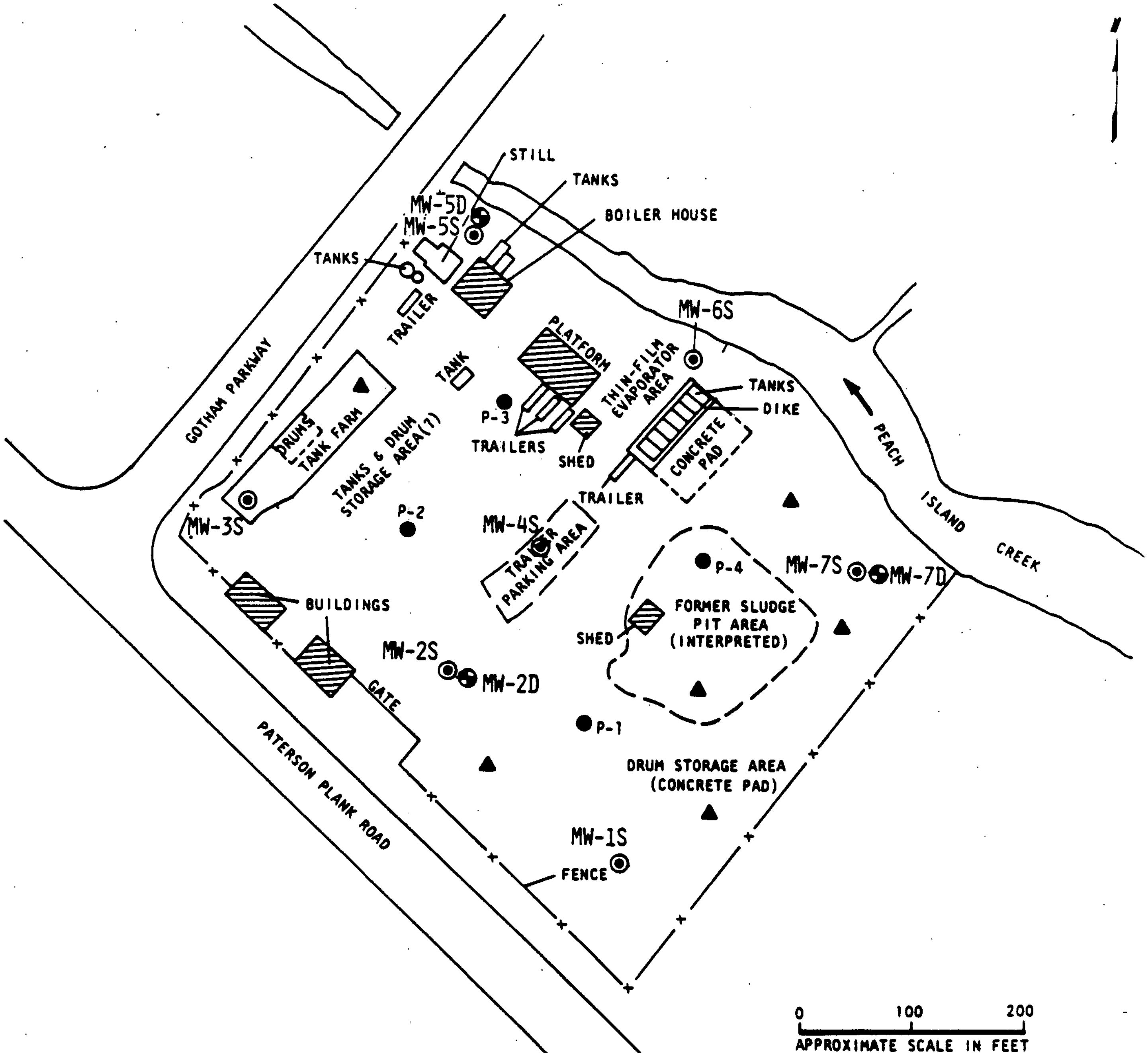
TABLE 7-3

Soil Samples from Monitor Well and Piezometer Borings

Boring	Unsaturated Zone[1]	Saturated Zone[2]	Total
MW-2D	3	2	5
MW-5D	3	2	5
MW-7D	3	2	5
MW-1S	3		3
MW-3S	3		3
MW-4S	3		3
MW-6S	3		3
P-1	3		3
P-2	3		3
P-3	3		3
P-4	3		3
			39

1. First sample to be taken at a depth of 0-1 foot (0.5 to 1 foot for VOCs). Second sample to be taken at a depth of 2-3 feet. Third sample to be taken at a depth of 4-5 feet or approxiamtely 1 foot above the ground water table, whichever is greater.

2. Samples to be collected at the top and bottom of the clay layer (or the till layer, if the clay is absent).



NOTES:
1. ALL DRUMS, MOST TANKS AND TANK TRAILERS HAVE BEEN REMOVED AND SOME FACILITIES HAVE BEEN DISMANTLED SINCE OPERATIONS CEASED IN 1979.
2. BASE MAP REFERENCE: AERIAL PHOTOGRAPH NO. 3818-6-35, MARCH 27, 1984. SCALE: 1" = 100'±

PROPOSED SOIL AND GROUNDWATER SAMPLING LOCATIONS

KEY:

MW-1S ◎ SHALLOW MONITORING WELL

MW-2D SHALLOW DEEP MONITORING WELL

P-1 ● SHALLOW PIEZOMETER

▲ SHALLOW BORING OR TEST PIT FOR SOIL SAMPLING (APPROXIMATE LOCATIONS)

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FIGURE 7-1

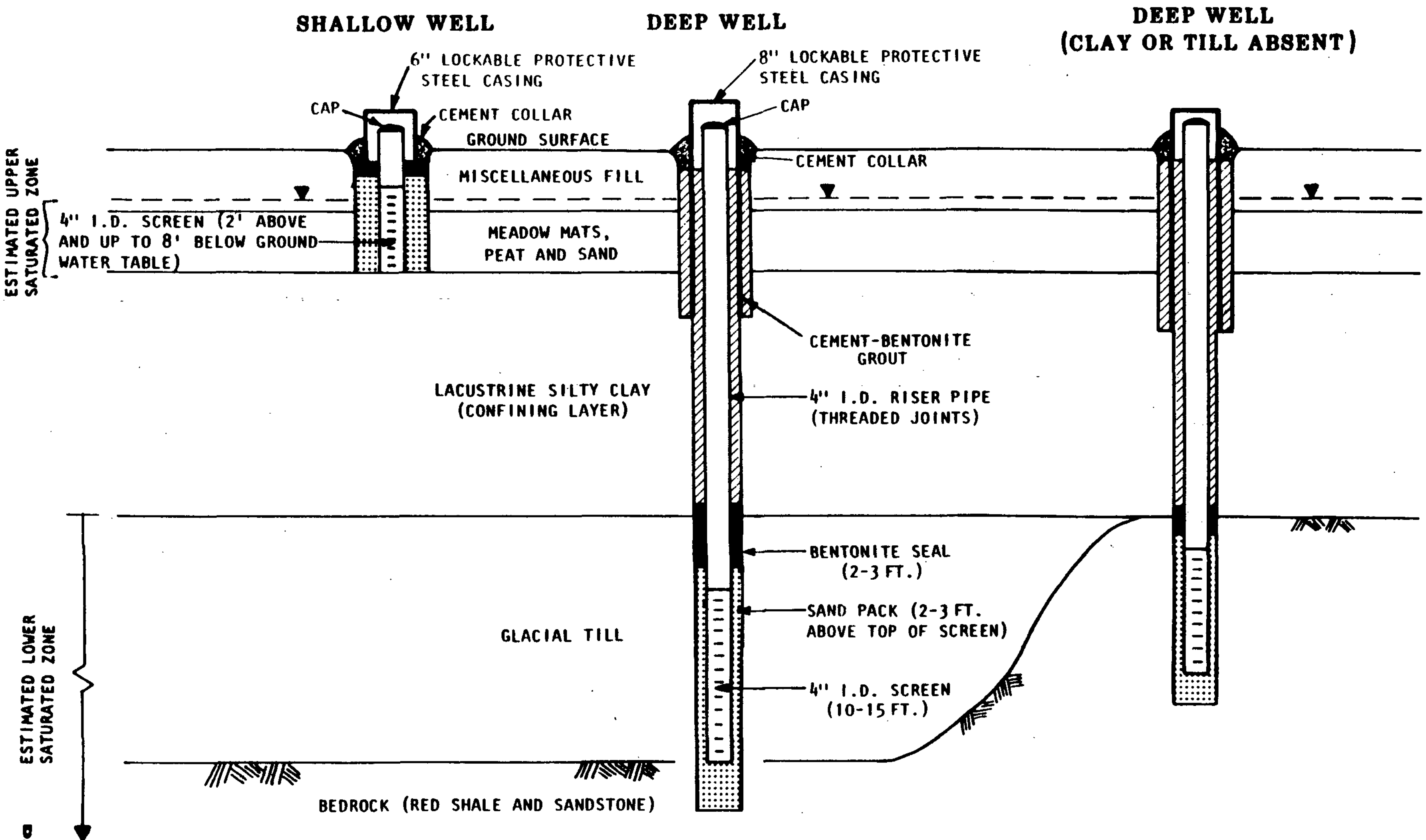

FIGURE 7-

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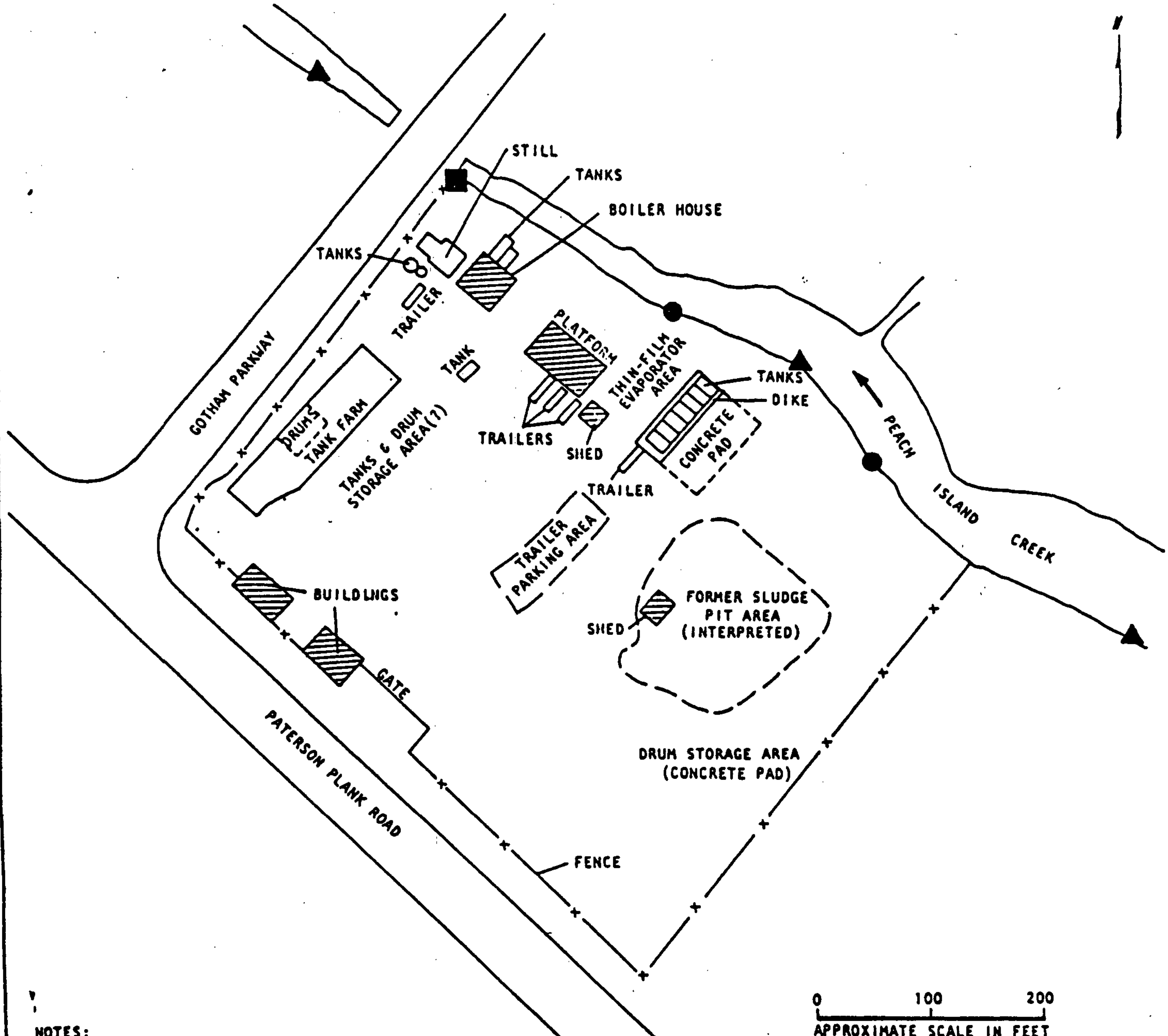
TYPICAL MONITORING WELL INSTALLATION PROFILE AND CONSTRUCTION DETAILS

(NOT TO SCALE)



NOTES:
1. ALL DRUMS, MOST TANKS AND TANK TRAILERS HAVE BEEN REMOVED AND SOME FACILITIES HAVE BEEN DISMANTLED SINCE OPERATIONS CEASED IN 1979.
2. BASE MAP REFERENCE: AERIAL PHOTOGRAPH NO. 3818-6-35, MARCH 27, 1984. SCALE: 1" = 100'±

PROPOSED GROUND WATER SEEPS AND STREAM SAMPLING LOCATIONS

KEY:

▲ STREAM WATER AND SEDIMENT SAMPLING LOCATION (APPROXIMATE)

● GROUND WATER SEEP SAMPLING LOCATION (APPROXIMATE)

■ TIDE RECORDER

000441

FIGURE 7-3

GROUND WATER SAMPLING RECORD

CLIENT: JOB NO:

LOCATION: SAMPLED BY: ______________

SITE NO.
AND NAME: ______________________________

DATE: ______________ TIME: ______________

WELL TYPE: ☐ Monitor ☐ Potable ☐ Supply

☐ Other ______________

WELL NO.: ______________ WELL SIZE (I.D., inches): ______________

TOP OF CASING (TOC) ELEVATION (ft. MSL): ______________

DEPTH TO STATIC WATER LEVEL (ft. below TOC): ______________

STATIC WATER LEVEL ELEVATION (ft. MSL): ______________

DEPTH TO BOTTOM OF WELL (ft. below TOC): ______________

SCREENED INTERVAL (ft. below TOC): ______________

VOLUME OF WATER TO BE EVACUATED (gallons)*: ______________

VOLUME OF WATER EVACUATED (gallons): ______________

EVACUATION METHOD: Submersible Pump ☐ Centrifugal Pump ☐

Positive Displacement Pump ☐ Bailer ☐

Other ______________

SAMPLING METHOD: Submersible Pump ☐ Positive Displacement Pump ☐

Stainless Steel Bailer (Bottom Fill) ☐

Other ______________

SAMPLE NO.: ______________ SAMPLE DEPTH (ft. below TOC): ______________

SAMPLE TREATMENT: Field Filtered ☐ Preservative Added ☐

SAMPLE APPEARANCE, ODOR, ETC: ______________________________

____

FIELD TESTS:

SAMPLE TEMP. (°C): ______________ pH: ______________

CONDUCTIVITY (mhos/cm): ______________ PID (ppm): ______________

LABORATORY ANALYSIS: ______________________________

____

NO. OF CONTAINERS AND I.D.: ______________________________

FIELD BLANK I.D. NO.: ______________

TRIP BLANK I.D. NO.: ______________

DUPLICATE SAMPLE I.D.: ______________

COMMENTS: ______________________________

____

____

____

6-inch 1.47

*4-inch casing has 0.65 gallons/ft.
2-inch casing has 0.16 gallons/ft.

000442

FIGURE 7-4

SURFACE SAMPLING RECORD

CLIENT: JOB NO.

LOCATION: SAMPLED BY: ____________

SITE NO.
AND NAME: ____________

DATE: ____________ TIME: ____________

SAMPLE CLASSIFICATION:

Soil ☐ Water ☐

Surface Water ☐ Ground Water Seep ☐ Boring ☐

Pipe Outfall ☐ Sediment ☐ Excavation ☐ Other ____________

SAMPLING METHOD:

Direct Fill Container ☐ Remote Fill ☐ Dipper Jar/Can ☐

Peristaltic Pump ☐ Positive Displacement Pump ☐ Bailer ☐

Core Sampler ☐ Standard Split Spoon ☐ D&M Sampler ☐

Hand Auger ☐ Stainless Spoon/Trowel ☐ Other ____________

SAMPLE TYPE: Point ☐ Grab ☐ Composite ☐

SAMPLE NO: ____________ SAMPLE DEPTH: ____________

SAMPLE TREATMENT: Field Filtered ☐ Preservative Added ☐

SAMPLE APPEARANCE, ODOR, ETC: ____________

____

FIELD TESTS:

SAMPLE TEMP. (°C): ____________ pH: ____________

CONDUCTIVITY (mhos/cm): ____________ PID (ppm): ____________

OTHER: ____________

LABORATORY ANALYSIS: ____________

____

NO. OF CONTAINERS AND I.D.: ____________

FIELD BLANK I.D. NO.: ____________

TRIP BLANK I.D. NO.: ____________

DUPLICATE SAMPLE I.D.: ____________

COMMENTS: ____________

____

____

____

000443

FIGURE 7-5

8.0 SAMPLE CUSTODY PROCEDURES

Sample chain-of-custody is initiated by the laboratory with the selection and preparation of the sample containers. To reduce the chance for error, the number of personnel assuming custody of the sample and sample containers will be held to a minimum.

In situ or on-site monitoring and sampling data will be controlled and entered onto appropriate records. Personnel involved in the chain-of-custody and transfer of samples will be briefed on the procedures and their purposes prior to the initiation of sampling.

Field Sample Custody — A Chain-of-Custody Form and a Field Parameter Form will accompany the sample from initial sample container selection and preparation commencing at the laboratory, to the field for sample containment and preservation, through its return to the laboratory. The Chain-of-Custody Form will trace the path of each individual sample container by means of a unique identification number. The typical path of a Chain-of-Custody Form is illustrated by the sample custody flow chart shown in Figure 8-1. The Chain-of-Custody Form and the Field Parameter Form for this project are shown on Figures 8-2 and 8-3, respectively.

The Project Manager will notify the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival. Sample shipping containers (coolers or "shuttles") will be provided by the laboratory. The shipping containers will be insulated. All sample bottles within each shipping container will be individually labeled with an identification tag and controlled. Sample identification tags will be provided by Dames & Moore.

All sample bottle labels will include the following information:

a. site name
b. sample number
c. name of collector
d. date and time of collection
e. place of collection
f. type of sample
g. sample volume
h. analysis required
i. preservative

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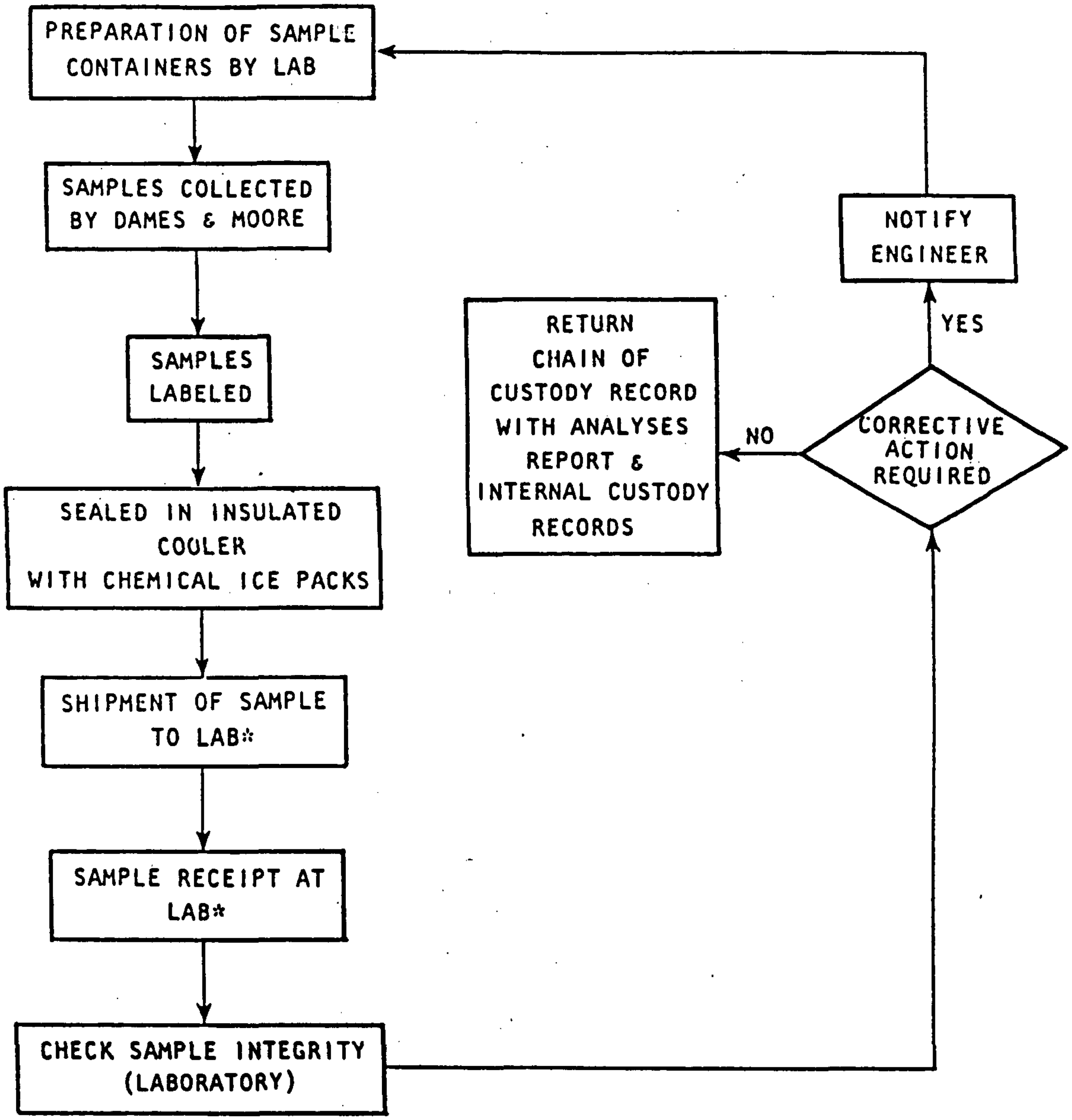
Each sample shipping container is assigned a unique identification number by the laboratory. This number is recorded on the Chain-of-Custody Form and is marked with indelible ink on the outside of the shipping container. The coolers will be picked up by Dames & Moore personnel at the laboratory or will be delivered to Dames & Moore by laboratory personnel.

Dames & Moore personnel receiving the sample containers will check each cooler for the integrity of the seals. Coolers with broken seals will be returned to the laboratory with the containers unused. The receiving Dames & Moore personnel will break the seal, and inspect the contents for breakage, and will sign the chain-of-custody form as having received the sample containers. A temporary seal will be affixed to each cooler until the sample containers are filled.

Once the sample containers are filled, they will be immediately placed in the cooler with sealed bags of ice or chemical ice to maintain the samples at $4^{O}C$. The field sampler will indicate the sample designation/location number in the space provided on the appropriate Chain-of-Custody Form for each sample of water or soil. The Chain-of-Custody Forms will be signed off and placed in the cooler. The samples will be delivered to the laboratory no later than 24 hours after sample collection.

If samples are split and sent to different laboratories, a copy of the Chain-of-Custody Form will be sent with the replicate sample. The original Chain-of-Custody Form will accompany the sample for the primary laboratory. The "remarks" column of the Chain-of-Custody Form (Figure 8-2) will be used to record specific considerations associated with sample acquisition such as: sample type, container type, sample preservation methods, and analyses to be performed. The laboratory will maintain on file, the completed original forms. Copies will be submitted as a part of the final analytical report.

<u>Laboratory Sample Custody</u> — Receipt, storage, and tracking of samples submitted to the laboratory is conducted according to strict protocol to prevent sample contamination or loss as well as the production of invalid laboratory data as a result of sample deterioration or tampering. A detailed description of internal laboratory chain-of-custody procedures prepared by ETC (Manual of Laboratory Standard Operating Procedures) is provided in Appendix E of this POP.



SAMPLE CUSTODY PATH

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*REQUIRES SIGN-OFF ON CHAIN OF CUSTODY FORM

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FIGURE 8-1

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. ____________ ETC Job # ____________

Date Sealed ____________ By: ____________

Company: ______________________________

Facility/Site: ______________________________

Address: ______________________________

____

Attn.: ______________________________

Phone: ( ) ______________________________

SAMPLE IDENTIFICATION

Facility: [| | | | | | | | | |] Facility/Site Code [ ] (Optional Sample Point Descriptions)

Sample Point: [ ]–[| | | | | | | | | |] Source Code (from below) Your Sample Point ID (left justify) [| | | | |] Start Date (YY/MM/DD) [| | |] Start Time (2400 hr clock) [| |] Elapsed Hours (composite)

Source Codes:

Well ..(W) Outfall.......(O) Bottom Sediment....(B) Surface Impoundment....(I) Leachate Collection Sys.....(C) Other ....(X)

Soil . (S) River/Stream..(R) Generation Point....(G) Treatment Facility......(T) Lake/Ocean ....(L) Specify ____________

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		Fill (Y/N)	Observations	Observations

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) ____________ Date: ____________ Time: ____________
   Signature: ____________ Seal #: ____________ Intact: ____________

2. I have received these materials in good condition from the above person.
   Name: ____________ Signature: ____________
   Date: ____________ Time: ____________ Remarks: ____________

3. I have received these materials in good condition from the above person.
   Name: ____________ Signature: ____________
   Date: ____________ Time: ____________ Remarks: ____________

4. Shuttle Sealed By: (print) ____________ Date: ____________ Time: ____________
   Signature: ____________ Seal #: ____________ Intact: ____________

ETC USE ONLY Opened By: ____________ Date: ____________ Time: ____________

Seal #: ____________ Condition: ____________

FIGURE 8-2

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # ______________________

Sample Point [ ] [| | | | | | | | |]
Source Code — Sample Point I D

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: ______________________

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other ____________ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other ____________ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other ____________ (SPECIFY OTHER)

Sample Composited [Y/N] ______________________ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) [| | | | . | |] Well Depth (ft) [| | | . |]

Depth to Ground water (ft) [| | | | . | |] Sample Depth (non-well) (ft) [| | | . |]

Groundwater Elevation (ft msl) [| | | | . | |]

	ph			spec. cond.		(other parameter)	value	units
1st		(STD)	1st		um/cm at 25° C			
2nd		(STD)	2nd		um/cm at 25 °C			
3rd		(STD)	3rd		um/cm at 25 °C			
4th		(STD)	4th		um/cm at 25 °C			

Sample Temp [| | | |] (°C) Turbidity [| | | | |] NTU

FIELD COMMENTS

Sample Appearance: ______________________

Weather Conditions: ______________________

Other: ______________________

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: (Print) ______________________ Employer: ______________________

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

____
(Date) (Signature)

FIGURE 8-3

9.0 CALIBRATION PROCEDURES AND FREQUENCY

Air monitoring instrumentation (OVA and PID) used in the field to gather data for health and safety purposes as well as sample monitoring will be calibrated each day prior to initiation of field work. The instrumentation will be calibrated using the appropriate ultra-zero and indicator gases. Following calibration, each instrument will be tagged identifying the person who calibrated the instrument and the calibration date.

During all water sampling efforts, the pH meter will be calibrated with a fresh standard buffer solution (pH 7) prior to each field test. The operation of the instrument will be checked with fresh standard buffer solutions (pH 4 and pH 10) prior to each day's sampling. The specific conductivity meter will be calibrated prior to each sampling event using a standard solution of known conductivity. More frequent calibrations may be performed as necessary to maintain analytical integrity.

Calibration records for each field instrument used on the project will be maintained on-site and a copy kept in the project files. A copy of the daily calibration record is presented in Figure 9.1.

DAILY INSTRUMENT CALIBRATION CHECK SHEET

INSTRUMENT ____________________

SERIAL # ______________________

DATE	PURE AIR Y/N	CALIBRATION GAS (PPM)	BATTERY CHECK (GOOD/BAD)	CALIBRATED BY	REMARKS

FIGURE 9-1

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10.0 LABORATORY ANALYTICAL PROCEDURES

A laboratory testing program has been established for the analysis of soil, ground water and surface water samples. Table 10-1 shows the proposed number of samples and the tests to be performed on each sample. Sample locations are shown on Figures 7-1 and 7-3.

One round of soil and sediment samples are scheduled for analysis. These will be tested as they are obtained from the site exploration program.

Wells will be subjected to two rounds of sampling. This first round will be collected five to ten days following installation and development of the last monitoring well. The second round will be collected approximately eight weeks later, after the analytical results of the first round are available.

Seeps and surface water will also be subjected to two rounds of sampling. Sampling times will be determined by field conditions as discussed in Section 7.

Analytical procedures to be utilized are discussed in Appendix E. The summary of the detection limits for various constituents and media (soil and water) are provided on Tables 10-2, 10-3 and 10-4.

TABLE 10-1

SUMMARY OF ANALYTICAL PROGRAM

	SOIL							GROUND WATER				STREAM			
	3 DEEP WELLS	4 SHALLOW WELLS	4 PIEZOMETERS	SLUDGE PIT	TANK FARM	ADDITIONAL LOCATIONS (4)		WELLS-ROUND I	WELLS-ROUND II	GROUND WATER SEEPS (2 ROUNDS)		WATER (2 ROUNDS)	SEDIMENT		TOTAL
NUMBER OF SAMPLES	15	12	12	3	3	12		10	10	4		8	8		97
PRIORITY POLLUTANTS MEK, STYRENE, M-XYLENE, O-XYLENE	●	●	●	●	●	●		●	●	●		●	●		97
PETROLEUM HYDROCARBONS	●	●	●	●	●	●		●	●	●		●	●		97
pH								●	●	●		●			32
ACIDITY/ALKALINITY								●	●	●		●			32
SPECIFIC CONDUCTANCE								●	●	●		●			32

NOTES:

1). ROUND II WATER SAMPLES WILL BE ANALYZED FOR TARGETED PARAMETERS FOLLOWING REVIEW OF ROUND I SAMPLING RESULTS AND DISCUSSION WITH EPA.

2). pH AND SPECIFIC CONDUCTANCE WILL BE MEASURED IN THE FIELD.

3). FOR LISTING OF PRIORITY POLLUTANTS SEE TABLE 10-2.

000452

TABLE 10-2

Priority Pollutant List and
Contract Required Detection Limits (CRDL)**

Volatiles	CAS Number	Detection Limits* Low Water[a] ug/L	Low Soil/Sediment[b] ug/Kg
Chloromethane	74-87-3	10	10
Bromomethane	74-83-9	10	10
Vinyl chloride	75-01-4	10	10
Methylene chloride	75-09-2	5	5
1,1-Dichloroethylene	75-35-4	5	5
1,1-Dichloroethane	75-35-3	5	5
trans-1,2-dichloroethylene	156-60-5	5	5
Chloroform	67-66-3	5	5
1,2-Dichloroethane	107-06-2	5	5
1,1,1-Trichloroethane	71-55-6	5	5
Carbon tetrachloride	56-23-5	5	5
1,1,2,2-Tetrachloroethane	79-34-5	5	5
1,2-Dichloropropane	78-87-5	6	6
trans-1,3-dichloropropane	10061-02-6	5	5
Trichloroethylene	79-01-6	5	5
Dibromochloromethane	124-48-1	5	5
1,1,2-Trichloroethane	79-00-5	5	5
Benzene	71-43-2	5	5
cis-1,3-Dichloropropylene	10061-01-5	5	5
2-Chloroethyl vinyl ether	110-75-8	10	10
Bromoform	75-25-2	5	5
Tetrachloroethylene	127-18-4	5	5
Toluene	108-88-3	6	6
Chlorobenzene	108-90-7	6	6
Ethyl benzene	100-41-4	7.2	7.2
Chloroethane	75-00-3	10	10
Dichlorodifluoromethane	75-71-8	10	10
Trichlorofluoromethane	75-69-4	10	10
Acrolein	107-02-8	100	100
Acrylonitrile	107-13-1	100	100
Dichlorobromomethane	75-27-4	5	5
Acid Extractables		**Low Water[c]**	**Low Soil/Sediment[d]**
Phenol	108-95-2	10	330
2-Chlorophenol	95-57-8	10	330
2-Nitrophenol	88-75-5	10	330
2,4-Dimethylphenol	105-67-9	10	330
2,4-Dichlorophenol	120-83-2	10	330
4-Chloro-3-methylphenol	59-50-7	10	330
2,4,6-Trichlorophenol	88-06-2	10	330
2,4-Dinitrophenol	51-28-5	50	1600
4-Nitrophenol	100-02-7	50	1600
Pentachlorophenol	87-86-5	50	1600
4,6 Dinitro-o-cresol		50	1600

TABLE 10-2 (Continued)

Base/Neutral Extractables	CAS Number	Detection Limits* Low Water[c] ug/L	Low Soil/Sediment[d] ug/Kg
bis(2-Chloroethyl) ether	111-44-4	10	330
1,3-Dichlorobenzene	541-73-1	10	330
1,4-Dichlorobenzene	105-46-7	10	330
1,2-Dichlorobenzene	95-50-1	10	330
bis(2-Chloroisopropyl) ether	39638-32-9	10	330
N-Nitroso-dipropylamine	621-64-7	10	330
Hexachloroethane	67-72-1	10	330
Nitrobenzene	98-95-3	10	330
Isophorone	78-59-1	10	330
bis(2-Chloroethoxy) methane	111-91-1	10	330
1,2,4-Trichlorobenzene	120-82-1	10	330
Naphthalene	91-20-3	10	330
Hexachlorobutadiene (para-chloro-meta-cresol)	87-68-3	10	330
Hexachlorocyclopentadiene	77-47-4	10	330
2-Chloronaphthalene	91-58-7	10	330
Dimethyl Phthalate	131-11-3	10	330
Acenaphthylene	208-96-8	10	330
Acenaphthene	83-32-9	10	330
2,4-Dinitrotoluene	121-14-2	10	330
2,6-Dinitrotoluene	606-20-2	10	330
Diethylphthalate	84-66-2	10	330
4-Chlorophenyl phenyl ether	7005-72-3	10	330
Fluorene	86-73-7	10	330
N-nitrosodiphenylamine	86-30-6	10	330
4-Bromophenyl phenyl ether	101-55-1	10	330
Hexachlorobenzene	118-74-1	10	330
Phenanthrene	85-01-8	10	330
Anthracene	120-12-7	10	330
Di-n-butylphthalate	84-74-2	10	330
Fluoranthene	206-44-0	10	330
Benzidine	92-87-5	100	1600
Pyrene	129-00-0	10	330
Butyl benzyl phthalate	85-68-7	10	330
3,3'-Dichlorobenzidine	91-94-1	20	660
Benzo(a)anthracene	56-55-3	10	330
bis(2-ethylhexyl)phthalate	117-81-7	10	330
Chrysene	218-01-9	10	330
Di-n-octyl phthalate	117-84-0	10	330
Benzo(b)fluoranthene	105-99-2	10	330
Benzo(k)fluoranthene	207-08-9	10	330
Benzo(a)pyrene	50-32-8	10	330
Indeno(1,2,3-cd)pyrene	193-39-5	10	330
Dibenz(a,h)anthracene	53-70-3	10	330
Benzo(g,h,i)perylene	191-24-2	10	330
1,2 Diphenylhydrazine		10	330

TABLE 10-2 (Continued)

Pesticides/PCB's	CAS Number	Detection Limits* Low Water[e] ug/L	Low Soil/Sediment[f] ug/Kg
alpha-BHC	319-84-6	0.05	2.0
beta-BHC	319-85-7	0.05	2.0
delta-BHC	319-86-8	0.05	2.0
gamma-BHC (Lindane)	58-89-9	0.05	2.0
Heptachlor	76-44-8	0.05	2.0
Aldrin	309-00-2	0.05	2.0
Heptachlor Epoxide	1074-57-3	0.05	2.0
Endosulfan I	959-98-8	0.05	2.0
Dieldrin	60-57-1	0.10	4.0
4,4'-DDE	72-55-9	0.10	4.0
Endrin	72-20-8	0.10	4.0
Endosulfan II	33213-65-9	0.10	4.0
4,4'-DDD	72-54-8	0.10	4.0
Endrin Aldehyde	7421-93-4	0.10	4.0
Endosulfan Sulfate	1031-07-8	0.10	4.0
4,4'-DDT	50-29-3	0.10	4.0
Chlordane	57-74-9	0.5	20.0
Toxaphene	8001-35-2	1.0	40.0
AROCLOR-1016	12674-11-2	0.5	20.0
AROCLOR-1221	11104-28-2	0.5	20.0
AROCLOR-1232	11141-16-5	0.5	20.0
AROCLOR-1242	53469-21-9	0.5	20.0
AROCLOR-1248	12672-29-6	0.5	20.0
AROCLOR-1254	11097-69-1	1.-	40.0
AROCLOR-1260	11096-82-5	1.0-	40.0

[a]Medium Water Contract Required Detection Limits (CRDL) for Volatile Compounds are 100 times the individual Low Water CRDL.

[b]Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Volatile Compounds are 100 times the individual Low Soil/Sediment CRDL.

[c]Medium Water Contract Required Detection Limits (CRDL) for acid and base/neutrals extractable Compounds are 100 times the individual Low Water CRDL.

[d]Medium Soil/Sediment Contract Required Detection Limits (CRDL) for acid and base/neutral extractable Compounds are 60 times the individual Low Soil/Sediment CRDL.

[e]Medium Water Contract Required Detection Limits (CRDL) for Pesticide Compounds are 100 times the individual Low Water CRDL.

[f]Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Pesticide compounds are 60 times the individual Low Soil/Sediment CRDL.

*Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the contract, will be higher.

**Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable.

TABLE 10-3

ANALYTICAL METHODS AND DETECTION LEVELS FOR METALS

		Contract Required Detection Level (ug/l)
Antimony	Method 204.2	60
Arsenic	Method 206.2	20
Beryllium	Method 210.2	5
Cadmium	Method 213.2	5
Chromium	Method 218.2	10
Copper	Method 220.2	25
Lead	Method 239.2	5
Mercury	Method 245.1	0.2
Nickel	Method 249.2	40
Selenium	Method 270.2	5
Silver	Method 272.1	10
Thallium	Method 279.2	10
Zinc	Method 289.2	20

TABLE 10-4

Additional Target Parameters

	CAS Number	Contract Required Detection Limit (ug/l)
Methyl Ethyl Ketone	78-93-3	10
Styrene	100-42-5	5
m-xylene	108-38-3	5
o-xylene	95-47-6	5

11.0 DOCUMENTATION, DATA REDUCTION, REPORTING AND VALIDATION

Documentation, data reduction and reporting are controlled through a set of standard operation procedures which are used in the field and laboratory. The standard operating procedures are provided in Section 7 and Appendix E of this document.

Data validation and reduction is controlled through the use of chain-of-custody records, labeling of samples, sample tracking records (in the laboratory) and reviews of the results to check for completeness and accuracy. Non-conforming items are noted and corrective actions implemented as necessary to correct problems with data validation.

Laboratory data validation will follow CLP data validation methodologies where appropriate.

Data will ultimately be presented in a formal Remedial Investigation report to be submitted to the USEPA. The report is currently scheduled to be submitted approximately 30 weeks after EPA approval of this POP.

12.0 PERFORMANCE AND SYSTEM AUDITS

Quality Assurance audits are performed under the direction and approval of the Quality Assurance Manager (QAM). The QAM will plan, schedule and approve system and performance audits based upon company procedures customized to the project requirements. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). At times, the QAM may request additional personnel with specific expertise from within the company and/or project groups to assist in conducting performance audits. However, these personnel will not have participated in, nor have responsibility for, the direct work associated with the performance audit.

Performance and system audits by the QAM or designated auditors will encompass evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation will be system audited. The audit checklist developed for the SCP site is shown on Figure 12-1. The auditable project activities form the basis for this checklist. At least one unannounced field audit and one scheduled office audit will occur during the first 8 weeks of the project. It is desirable to perform the field audit while measurement systems are operational. In addition, audit of the laboratory data will occur within two weeks of the completion of the laboratory analyses (i.e., two audits, one after each round of sampling).

Audit reports will be written by the auditor(s) after gathering and evaluating all resultant data. Items, activities, and documents determined by auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Noncompliances will be logged, documented, and controlled through Audit Findings which are attached to and a part of the integral audit report. These audit finding forms are directed to project management to satisfactorily resolve the noncompliance in a specified and timely manner. All audit reports, audit findings, and acceptable resolutions are approved by the QAM prior to being issued. QA verification of acceptable resolutions may be determined by a re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAM will close out the audit report and findings. Copies of all audit reports and audit findings will be made availalbe to the EPA.

It is the Project Manager's overall responsibility to ensure that all corrective actions to resolve audit findings are acted upon promptly and satisfactorily.

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FIGURE 12-1

SCP SITE QUALITY ASSURANCE
AUDIT CHECKLIST

Project SCP SITE Project Manager ____________

Site Location CARLSTADT, NEW JERSEY

Auditor ____________ Date ____________

Question	Yes	No	Comment/Documentation
FIELD:			
1. Was an on-site safety officer appointed?			
2. Did site personnel receive a copy of the site specific sampling and analytical plan in a timely manner to allow for sufficient review?			
3. Are copies available in the field during sampling?			
4. Was a briefing held off-site, before any site work was begun to acquaint personnel with sampling equipment, assign field responsibilities and review safety procedures?			
5. Do field personnel have a field notebook?			
6. Are the site survey grid stakes present?			
7. Are the number and location of samples collected following procedures as specified in the site specific sampling and analytical plan?			
8. Are samples labeled as described in Section 8 of the POP?			
9. Are samples being collected following the procedures specified in the POP?			
10. Was a chain of custody form filled out for all samples collected?			
11. Are samples preserved as specified in Appendix E of the POP?			

FIGURE 12-1

SCP SITE QUALITY ASSURANCE
AUDIT CHECKLIST

Question	Yes	No	Comment/Documentation
12. Are the number, frequency and type of samples (including blanks and duplicates) collected as described in the POP?			
13. Are the number, frequency and type of measurements and observations taken as specified in the site specific sampling and analytical plan?			
14. Are operating procedures for field equipment available?			
15. Is a record maintained of calibration of field equipment?			
16. Is field equipment being calibrated as required?			
17. Are geophysical cross-sections correlated to geologic data?			
18. Is safety equipment being used by field personnel?			
19. Is emergency safety equipment available as required in the Health & Safety Plan?			
20. Are well designations clearly labeled? (i.e., well numbers)			
21. Are caps on wells locked if not being used?			
OFFICE:			
22. Are laboratory data verification sheets signed and filed?			
23. Are sampling sheets records completed and filed?			

FIGURE 12-1

SCP SITE QUALITY ASSURANCE
AUDIT CHECKLIST

Question	Yes	No	Comment/Documentation
24. Are laboratory QA data on file?			
25. Is field calibration of instruments documented?			
26. Are Chain-of-Custody forms completed and on file?			
27. Are originals of all procedures which form the POP retained in the Quality Assurance file?			
28. Are any revisions to procedures adequately documented?			
29. Is a file for chain of custody records and other sample traffic control forms maintained?			
30. Have any accountable documents been lost?			

13.0 PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

Field equipment is subjected to a routine maintenance program prior to and after use. Equipment is cleaned and its integrity checked after each use. In addition, parts with a limited life (such as batteries, membranes and some electronic components) are periodically checked and replaced.

Preventive maintenance is important to Dames & Moore, since it provides for a longer useful life of the equipment and helps to assure a successful field sampling and testing program. Each piece of field equipment has its own log sheet which contains the equipment I.D.#, information on maintenance procedures and the date of last maintenance (and type of maintenance). Since most equipment is used on an irregular, as needed basis, formalized maintenance schedules are not established. A sample log sheet is provided as Figure 13-1.

Laboratory equipment maintenance is regularly performed by ETC. It is the laboratory's responsibility to maintain properly functioning equipment so that data are valid and reproducible. A discussion of ETC's laboratory procedures is included in Appendix E.

EQUIPMENT CALIBRATION MAINTENANCE & REPAIR LOG

TYPE OF EQUIPMENT: ______________________________

MANUFACTURER: ______________________________

MODEL: ______________________________

SERIAL #: ______________________________

MAINTENANCE PROCEDURES: ____

____

____

____

____

____

____

DATE USED	BY	JOB #	CALIBRATION YES/NO	OPERATING PROCEDURES ATTACHED YES/NO	MAINTENANCE PERFORMED, WORKING CONDITION, PARTS REPLACED: DESCRIBE (i.e. replaced membrane, cleaned hoses, etc.)

FIGURE 13-1

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14.0 PRECISION, ACCURACY AND COMPLETENESS

The precision, accuracy and completeness of field and laboratory measurements are established through the use of the Dames & Moore QA/QC program. Continuing calibration of equipment, use of sample blanks and duplicates, evaluation of quality nonconformances and adherence to the procedures established for this project all help to assure the quality of the sample results.

14.1 Field Control

As part of the Quality Assurance program, several blank and duplicate samples will be prepared or collected and analyzed to:

1. provide a check on sample bottle preparation; and
2. evaluate the "repeatability" and accuracy of laboratory analytical procedures.

Duplicate samples and trip blanks will be utilized as discussed in Section 6.2. All duplicate samples will be labeled as regular samples so that they cannot be identified as duplicates by the laboratory.

14.2 Laboratory Control

Environmental Testing and Certification (ETC) of Edison, New Jersey has been selected as the analytical laboratory for this project. A manual of Laboratory Standard Operating Procedures prepared by ETC is provided in Appendix E. The ETC manual includes a description of:

- Chain-of-Custody Procedures;
- Sample Containers and Holding Times;
- Analytical Methods;
- Quality Control, Precision and Accuracy Procedures;
- Data Validation Procedures;
- Performance and System Checks;
- Sample Equipment Cleaning Procedures;
- Sample Container Cleaning Procedures;

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- Health and Safety Procedures; and
- Data Reporting Formats.

All laboratory analyses will be performed in accordance with the latest EPA and NJDEP approved procedures. If such procedures are not available, the latest industry-accepted procedures will be used.

15.0 CORRECTIVE ACTION

The following procedures have been established to assure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated and corrected.

When a significant condition adverse to quality is noted at the site, laboratory or subcontractor locations, the cause of the condition will be determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the site investigation team leader, project manager, task leaders, QA manager and involved subcontractor management, as a minimum. Implementation of corrective action is verified by documented followup by the QAM. All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality.

Corrective actions may be initiated as a minimum when:

- predetermined acceptance standards are not attained;
- procedure or data compiled are determined to be dubious;
- equipment or instrumentation is found faulty;
- samples and test results are questionably traceable;
- quality assurance requirements have been violated;
- designated approvals have been circumvented;

or as a result of:

- system and performance audits;
- a management assessment.

Procedure Description - Project management and staff, such as fieid investigation teams, remedial response planning personnel, quality assurance auditors, document and sample control personnel, and laboratory groups, monitor ongoing work performance in the normal course of daily responsibilities.

Work is audited at the sites, laboratories, and subcontractor locations by the QAM or designated auditors. Items, activities, or documents ascertained to be in noncompliance with quality assurance requirements will be documented and corrective

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actions mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the QAM.

The Corrective Action Request (CAR) identifies the adverse condition, reference document(s), and recommended corrective action(s) to be administered. The issued CAR is directed to the responsible management in charge of the item or activity for action. The individual to whom the CAR is addressed returns the requested response promptly to the QAM, affixing his signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QAM maintains the log for status control of CAR's and responses, confirms the adequacy of the intended corrective action, and verifies its implementation. The QAM will issue and distribute CAR's to specified personnel, including the originator, responsible project management involved with the condition, the project manager, and the involved subcontractor, as a minimum. CAR's are transmitted to the project file for the records. An example of a CAR is shown on Figure 15-1.

CORRECTIVE ACTION REQUEST

NUMBER ____________ DATE ____________

TO ______________________________

YOU ARE HEREBY REQUESTED TO TAKE CORRECTIVE ACTIONS INDICATED BELOW AND AS OTHERWISE DETERMINED BY YOU (A) TO RESOLVE THE NOTED CONDITION AND (B) TO PREVENT IT FROM RECURRING. YOUR WRITTEN RESPONSE IS TO BE RETURNED TO THE PROJECT QUALITY ASSURANCE MANAGER BY ____________________.

CONDITION

REFERENCE DOCUMENTS

RECOMMENDED CORRECTIVE ACTIONS

ORIGINATOR	DATE	APPROVAL	DATE	APPROVAL	DATE

RESPONSE

CAUSE OF CONDITION

CORRECTIVE ACTION

(A) RESOLUTION

(B1) PREVENTION

(B2) AFFECTED DOCUMENTS

SIGNATURE ________________ DATE _____

Q.A. FOLLOW-UP

CORRECTIVE ACTION VERIFIED: BY ________________ DATE _____

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FIGURE 15-1

16.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Effective management of a field sampling and analytical effort requires timely assessment and review of field activities. This will require effective interaction and feedback between the field team members, the task leader, and the Project Manager.

The task leader will keep the Project Manager up-to-date regarding potential quality control problems so that a quick and effective solution can be implemented. Topics they may address include:

- summary of activities and general program status;
- summary of calibration data;
- summary of unscheduled maintenance activities;
- summary of corrective action activities;
- status of any unresolved problems;
- assessment and summary of data completeness; and
- summary of any significant QA/QC problems and recommended and/or implemented solutions not included above.

The system auditor will prepare an audit report following the performance and systems audit which will address data accuracy, and the qualitative assessment of overall system performance. This report will be submitted to the project director, project manager, task leaders, and field team leaders. The project final report will include a separate QA/QC section which summarizes the audit results, as well as the QC data collected throughout the duration of the program.

Problems requiring swift resolution will be brought to the immediate attention of the Project Manager and Project Director.

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APPENDIX A

WORK/QA PLAN SHORT FORM

APPENDIX A

1. Project Name: SCP Site RI/FS
2. Project Requested By: U.S. EPA
3. Date of Request: September 30, 1985
4. Date of Project Initiation: October 28, 1985
5. Dames & Moore Project Manager: Gerard M. Coscia
6. Dames & Moore Quality Assurance Manager: Elizabeth Neskow
7. Project Description

A. Objective and Scope Statement.

The SCP site investigation is designed to investigate the geological and hydrogeological conditions at the site and to evaluate the extent (if any) of ground water, surface water, soil and sediment contamination at the site.

B. Data Usage.

The data gathered will be used to assess the extent to which any detected contamination poses a threat to public health and welfare, or the environment. In addition, the data gathered will be used for the development and evaluation of remedial action alternatives (feasibility study) to mitigate threats to public health and welfare, and the environment.

C. Monitoring Network Design and Rationale

To evaluate the extent and nature of contamination at the SCP site, Dames & Moore has designed a monitoring network to sample ground water, seeps, surface water and soils at the site, and to help define subsurface conditions. The following sections briefly describe the major components of the monitoring network and its rationale.

a. Site Survey and Map

A 50-foot x 50-foot grid or coordinate system over the entire surface of the site will be established, with stakes or other marks at the corners of each grid. This grid system shall be used for horizontal, location control of all field activities. In addition, a base map which will include the site and the surrounding area to a distance of at least 100 feet beyond the property boundaries, will be prepared. The map and staked site will be used to provide control for mapping field sampling locations.

b. Magnetometer Survey

A proton magnetometer will be used to locate buried ferromagnetic objects, such as drums and tanks. Survey lines will be spaced 10 feet apart. If required, additional lines shall be run to acquire additional data. The results of the magnetometer survey may be used to modify proposed boring, well and soil sampling locations.

c. Conductivity Survey

A conductivity survey will be performed to estimate the extent of contaminant plumes, if any. Survey lines shall be spaced 20 feet apart. If required, additional lines shall be run to acquire additional data. The results of the conductivity survey may be used to modify the locations of proposed borings and monitoring wells.

d. Soil Sampling

Soil samples for stratigraphic correlation and chemical analyses will be collected at 17 locations throughout the site as indicated on Figure A-1. Most soil samples will be collected in the monitoring well and piezometer borings. Test pits or shallow hand-augered borings will be used to obtain samples at locations where borings for piezometers or monitoring wells will not be drilled. All shallow borings will be sampled continuously to the ground water table. Subsequent sampling will be on a five-foot interval and at every major lithologic change. Deep borings will be sampled continuously to the top of the bedrock.

A total of 57 soil samples will be collected for chemical analysis at various locations and depths throughout the site. A total of 51 samples will be collected from the unsaturated zone. The remaining six samples will be collected from the saturated zone.

e. Hydrogeologic Investigation

Based upon the available stratigraphic and regional geohydrologic data, it appears that the zone having the most susceptibility to receiving contamination at the site is the shallow surficial zone consisting primarily of miscelleneous fill, meadow mats, and sand. The surficial zone is reported to be underlain by a layer of low permeability lacustrine silty clay which would act as a barrier to contaminated water migrating downward to the bedrock aquifer. Based upon the range of reported permeability values (10^{-6} to 10^{-7} cm/sec) and a possible range of hydraulic gradients across the clay layer (0.01 to 1.0), there appears to be a low probability that contaminated water, if any exists, has percolated through the clay layer. This hypothesis will be verified by appropriate hydrogeologic investigations, including separate monitor wells in the shallow fill zone and in the glacial till layer (or bedrock), and permeability testing of the clay layer.

Seven shallow 4-inch diameter monitoring wells will be installed at the approximate locations shown on Figure A-1. These locations may be modified based on the results of the geophysical surveys, as discussed in Sections 7.C.b & c of this Work QA/Plan.

Three deep monitoring wells will be installed at the approximate locations shown on Figure A-1, at within 10 feet from adjacent shallow wells. The wells are anticipated to extend to the top of the bedrock and will be screened through the lower 15 feet of the glacial till stratum, or through the entire thickness of the stratum, whichever is less. If either the till or clay units believed to be at the site are absent, the well will be screened in the bedrock.

Slug or injection tests will be conducted in each of the seven shallow monitor wells to estimate the permeability of the upper saturated zone. These data will be used in conjunction with the water levels and hydraulic gradients to estimate geohydrologic conditions at the site.

f. Seep Sampling

Two ground water seeps have been observed discharging into Peach Island Creek, along the norther boundary of the site. The water was discolored and formed a sheen on the surface of the stream. Since this may indicate the release of contaminants, the seeps will be sampled, if they are still present, during the field investigation program.

g. Stream Water and Sediment Sampling

Peach Island Creek is a possible surface water discharge point for potential contaminants from the site. Water and sediment samples will be taken up and downgradient of the site.

h. Underground Pipes

The NJDEP reported the existence of an underground pipe exposed along the bank of the creek. Dames & Moore will make a visual inspection along the creek to locate the pipe and sample the discharge, if any. This will help establish if the pipe is draining any potential contaminants from the site.

D. Monitoring Parameters and Their Frequency of Collection

Information on the monitoring parameters and frequency of collection are provided on Table A-1. Locations are shown on Figures A-1 and A-2.

8. Project Fiscal Information:
Not Applicable

9. Schedule of Activities:
The project schedule is shown on Figure 4-1 of the Project Operations Plan.

10. Project Organization and Responsibilities:

A project organization chart is shown on Figure A-3.

11. Data Quality Requirements and Assessments:

Sample analytical parameters and their detection limits are shown on Tables 10-2, 10-3, and 10-4 of the Project Operations Plan. The quantification limits, accuracy and precision are determined by ETC. For this project the EPA limits published in the Federal Register on October 26, 1984 will be used as acceptable precision and accuracy standards.

Data representativeness is discussed in Section 6 of the Project Operations Plan.

All data will be presented in units specified by ETC, generally in ug/l (liquids) or ug/Kg (solids).

It is desired to have 100% complete data. In cases where data are not complete, its acceptability will be evaluated on a case specific basis.

12. Sampling Procedures:

Procedures are contained in Section 7 of the Project Operations Plan.

13. Sample Custody Procedures:

Procedures are contained in Section 8 and Appendix E of the Project Operations Plan.

14. Calibration Procedures and Preventive Maintenance:

Procedures are addressed in Sections 9 and 13 of the Project Operations Plan.

15. Documentation, Data Reduction, and Reporting:

Procedures are discussed in Section 11 and Appendix E of the Project Operations Plan.

16. Data Validation:

The validation of data is the responsibility of ETC in the laboratory and Dames & Moore personnel in the field. Final validation of data is the responsibility of the Dames & Moore Quality Assurance Manager, using CLP protocols where appropriate.

17. Performance and System Audits:

Procedures for audits are provided in Section 12 of the Project Operations Plan. Dames & Moore quality assurance personnel are responsible for the audits.

18. Corrective Action:

Corrective action procedures are defined in Section 15 of the Project Operations Plan.

19. Reports:

The reporting procedures are discussed in Section 16 of the Project Operations Plan. The final report is the responsibility of the Project Manager.

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TABLE A-1

SUMMARY OF ANALYTICAL PROGRAM

	SOIL							GROUND WATER				STREAM			
	3 DEEP WELLS	4 SHALLOW WELLS	4 PIEZOMETERS	SLUDGE PIT	TANK FARM	ADDITIONAL LOCATIONS (4)		WELLS-ROUND I	WELLS-ROUND II	GROUND WATER SEEPS (2 ROUNDS)		WATER (2 ROUNDS)	SEDIMENT		TOTAL
NUMBER OF SAMPLES	15	12	12	3	3	12		10	10	4		8	8		97
PRIORITY POLLUTANTS MEK, STYRENE, M-XYLENE, O-XYLENE	●	●	●	●	●	●		●	●	●		●	●		97
PETROLEUM HYDROCARBONS	●	●	●	●	●	●		●	●	●		●	●		97
pH								●	●	●		●			32
ACIDITY/ALKALINITY								●	●	●		●			32
SPECIFIC CONDUCTANCE								●	●	●		●			32

NOTES:

1). ROUND II WATER SAMPLES WILL BE ANALYZED FOR TARGETED PARAMETERS FOLLOWING REVIEW OF ROUND I SAMPLING RESULTS AND DISCUSSION WITH EPA.

2). pH AND SPECIFIC CONDUCTANCE WILL BE MEASURED IN THE FIELD.

3). FOR LISTING OF PRIORITY POLLUTANTS SEE TABLE 10-2.

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TABLE A-2

Parameter Table

Parameter	No. of Samples(3)	Sample Matrix	Analyical Method and Reference(4)	Sample Preservation	Holding Time
(1) Volatile Organics (plus xylenes, styrene and MEK)	16	Water	USEPA Method 624	Cool, 4°C	7 days
Extractable Organics	16	Water	USEPA Method 625	Cool, 4°C	7 days till extraction: 40 days till analysis
Metals	16	Water	USEPA Method 200 series	Nitric acid to pH 2 and cool, 4°C	6 months
PCB	16	Water	USEPA Method 608	Cool, 4°C	7 days till extraction: 40 days till analysis
Pesticides	16	Water	USEPA Method 608	Cool, 4°C	7 days till extraction: 40 days till analysis
Acidity	16	Water	USEPA Method 305.1	Cool, 4°C	14 days
Alkalinity	16	Water	USEPA Method 310.1	Cool, 4°C	14 days
Petroleum Hydrocarbons	16	Water	USEPA Method 418.1	Cool, 4°C	1 day
(1) Volatile Organics (plus xylenes, styrene and MEK)	65	Soil	USEPA SW-846 (5030,8240)	Cool, 4°C	7 days
Extractable Organics	65	Soil	USEPA SW-846 (3540,8270)	Cool, 4°C	14 days till extraction: 40 days till analysis
Metals	65	Soil	USEPA SW-846 (3050,6010)	Cool, 4°C	6 months
PCB	65	Soil	USEPA SW-846 (3540,8080)	Cool, 4°C	7 days till extraction: 40 days till analysis
Pesticides	65	Soil	USEPA SW-846 (3540,8080)	Cool, 4°C	7 days till extraction: 40 days till analysis
(2) Petroleum Hydrocarbons	65	Soil	USEPA Method 418.1	Cool, 4°C	7 days

Reference: Federal Register 40 CFR, Part 136, October 26, 1984.
Field Sampling Procedures Manual, New Jersey Dept. of Environmental Protection, November, 1985.
ECRA Sampling Plan Guide (draft), New Jersey Dept. of Environmental Protection, June, 1986.
Methods for Chemical Analysis of Water & Wastes, USEPA - 600/4-79-020, March 1983.

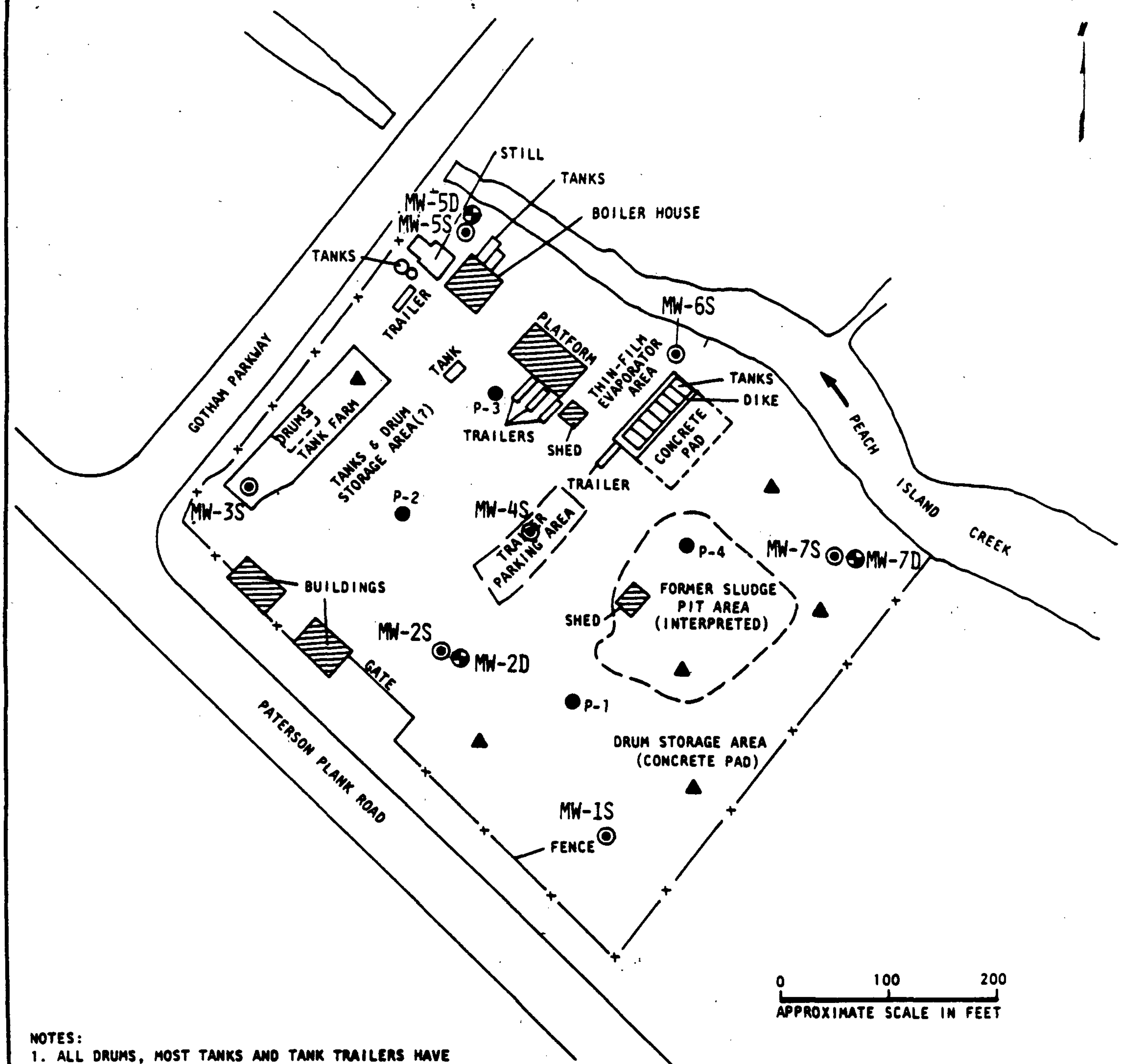
Notes:

(1) In the analysis of methyl ethyl ketone (MEK), styrene and xylenes from water samples, an extra spike is added for analyses using Method 624. For SW-846 analysis for soil samples, an extra spike is added and extraction procedures are followed.

(2) The method to be used for petroleum hydrocarbons in soil is as follows: Prepare sample as per oil and grease method as found in "Procedures for Handling and Chemical Analysis of Sediment and Water Samples", EPA/CE-81-1, NTIS #AD=A103788, then follow EPA Method 418.1 starting with paragraph 7.7 (note: add 3g silica gel for every 100 ml of final extract).

(3) Number of water samples reflects Round I water samples only. Round II water samples will be analyzed for target parameters only, following review of Round I sampling results and discussion with EPA. Number of soil samples includes eight sediment samples from Peach Island Creek.

(4) For USEPA SW-846 Analytical Methods, the number in parenthesis for each parameter are the the Method Work-up Number and the Method Analysis Number, respectively.



NOTES:
1. ALL DRUMS, MOST TANKS AND TANK TRAILERS HAVE BEEN REMOVED AND SOME FACILITIES HAVE BEEN DISMANTLED SINCE OPERATIONS CEASED IN 1979.
2. BASE MAP REFERENCE: AERIAL PHOTOGRAPH NO. 3818-6-35, MARCH 27, 1984. SCALE: 1" = 100'±

PROPOSED SOIL AND GROUNDWATER SAMPLING LOCATIONS

KEY:
MW-1S ◎ SHALLOW MONITORING WELL
MW-2D DEEP MONITORING WELL
P-1 ● SHALLOW PIEZOMETER
▲ SHALLOW BORING OR TEST PIT FOR SOIL SAMPLING (APPROXIMATE LOCATIONS)

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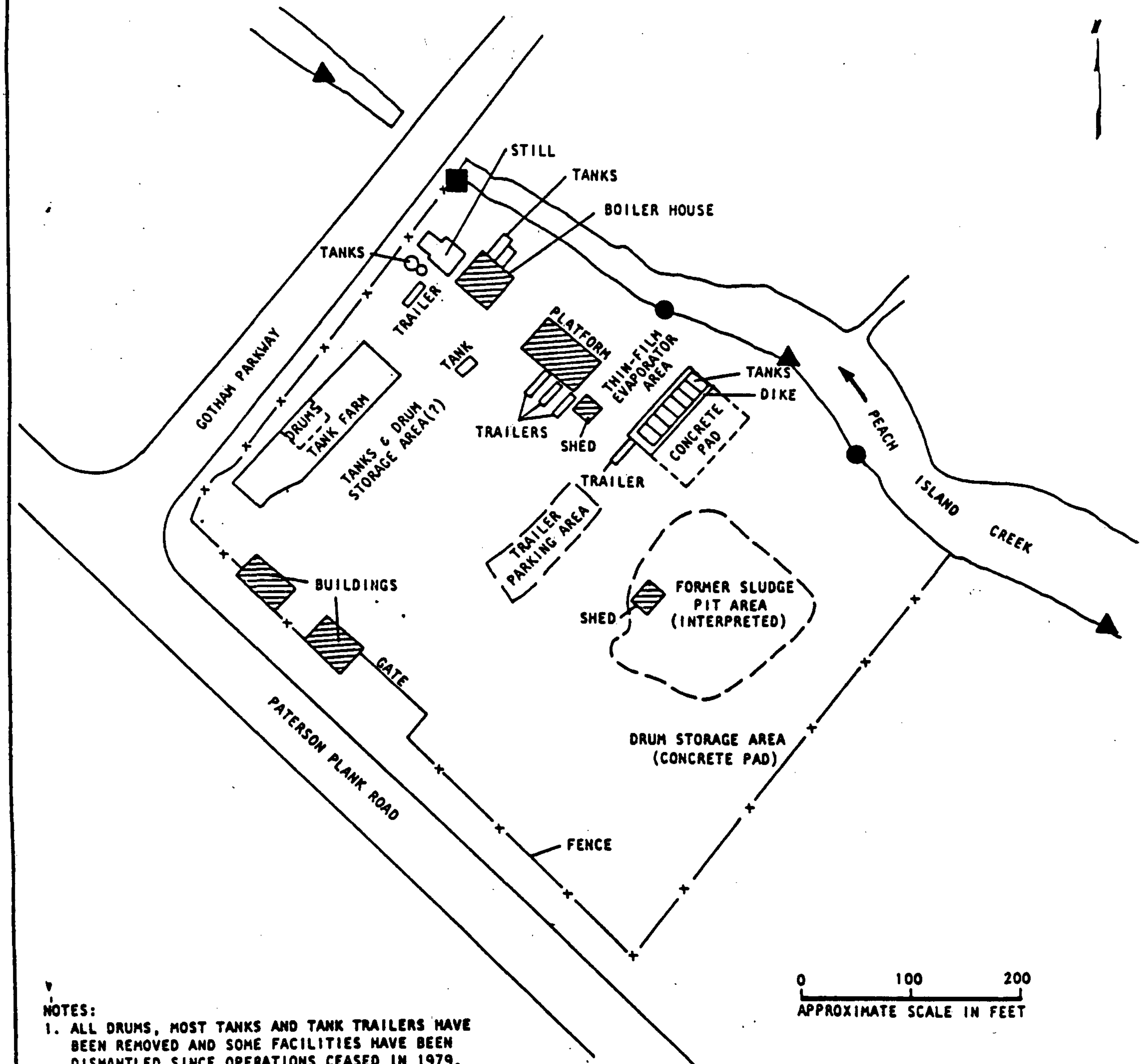
FIGURE A-1



NOTES:
1. ALL DRUMS, MOST TANKS AND TANK TRAILERS HAVE BEEN REMOVED AND SOME FACILITIES HAVE BEEN DISMANTLED SINCE OPERATIONS CEASED IN 1979.
2. BASE MAP REFERENCE: AERIAL PHOTOGRAPH NO. 3818-6-35, MARCH 27, 1984. SCALE: 1" = 100'±

PROPOSED GROUND WATER SEEPS AND STREAM SAMPLING LOCATIONS

KEY:

▲ STREAM WATER AND SEDIMENT SAMPLING LOCATION (APPROXIMATE)

● GROUND WATER SEEP SAMPLING LOCATION (APPROXIMATE)

■ TIDE RECORDER

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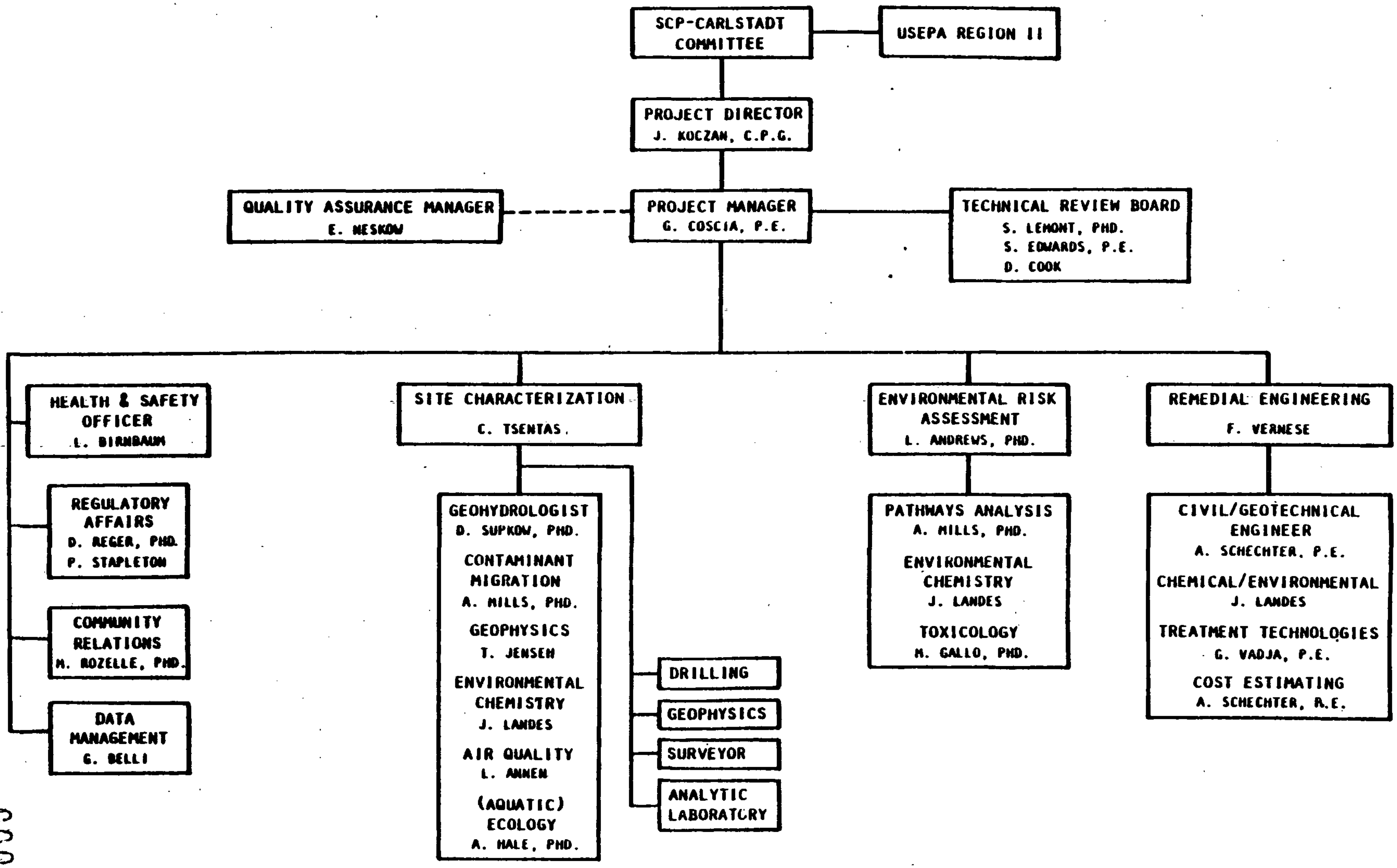
FIGURE A-2



PROJECT ORGANIZATION CHART
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
SCP INC. SITE, CARLSTADT, N.J.

FIGURE A-3

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APPENDIX B

DAMES & MOORE HEALTH AND SAFETY PLAN

DAMES & MOORE
HEALTH & SAFETY PLAN

Project Name:	Site Investigation, SCP Site
Project Number:	14485-002-10
Project Site Location:	Carlstadt, New Jersey
Project Manager:	Gerard M. Coscia
Site Safety Officers:	Bruce Scarbrough/Christina Grill
Plan Preparer:	Christina Grill
Plan Reviewer:	Leslie Birnbaum
Preparation Date:	January 1987

APPROVED:

Regional Healty & Safety Coordinator

______________________ (Date)

Office Safety Coordinator

Christina Grill 3-2-87
(Date

Managing Principal-in-Charge

William F. Mercuro 3/2/87
(Date)

Project Manager

Gerard M. Coscia 3/2/87
(Date)

Firm-wide Healty & Safety Director
(upon discretion of the FWHSD)

______________________ (Date)

H&S Plan Approval No.
CR-HS-50-86

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DAMES & MOORE
HEALTH & SAFETY PLAN

Project Name: Site Investigation, SCP Site

Project Number: 14486-002-10

Project Site Location: Carlstadt, New Jersey

Project Manager: Gerard M. Coscia

Site Safety Officers: Bruce Scarbrough/Christina Grill

Plan Preparer: Christina Grill

Plan Reviewer: Leslie Birnbaum

Preparation Date: January 1987

APPROVED:

Regional Healty & Safety Coordinator

________________ (Date)

Office Safety Coordinator

________________ (Date

Managing Principal-in-Charge

________________ (Date)

Project Manager

________________ (Date)

Firm-wide Healty & Safety Director
(upon discretion of the FWHSD)

________________ (Date) 3/2/87

H&S Plan Approval No.

000486

1.0 PURPOSE

The purpose of this Plan is to assign responsibilities, establish personnel protection standards and mandatory safety practices and procedures, and provide for contingencies that may arise while operations are being conducted at the site.

2.0 APPLICABILITY

The provisions of the Plan are mandatory for all on-site Dames & Moore employees engaged in hazardous material management activities including but not limited to initial site reconnaissance, preliminary field investigations, mobilization, project operations, and demobilization.

Contractors shall provide a Health & Safety plan for its employees covering any exposure to hazardous materials and shall complete all work in accordance with that plan. The Contractor may choose to use Dames & Moore Health & Safety Plan as a guide in developing its own plan or may choose to adopt Dames & Moore's plan. In either case, the Contractor shall hold Dames & Moore harmless from, and idemnify it against, all liability in the case of any injury. Dames & Moore reserves the right to review and approve the Contractors plan at any time.

Grossly inadequate H&S precautions on the part of the Contractor or the belief that the Contractor's personnel are or may be exposed to an immediate health hazard, can be the cause for D&M to suspend the Contractor's site work and ask the Contractor's personnel to evacuate the hazard area.

The Contractor shall provide its own safety equipment in accordance with Health & Safety Plan requirements. The Contractor will comply with all regulations including OSHA 29 CFR 1910 and 1926 standards.

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3.0 SITE DESCRIPTION

3.1 General Information

Site: Site Investigation, SCP Site Job No.: 14485-002-10

Objectives Supervise surveying, drilling and monitoring well installation.

Proposed Date of Investigation: March 1987

Background Review: ______ Complete: X Preliminary: ______

Documentation/Summary: Overall Hazard: Serious: ___ Moderate: X

Low: ___ Unknown: X

3.2 SITE HISTORY

The site was used by Scientific Chemical Processing, Inc. for recycling industrial wastes from 1971 until it was shut down by court order in October 1980. Prior to 1971, the site was reportedly operated by others for solvent refining and recovery since the 1950's.

While in operation, the facility received liquid wastes (primarily hydrocarbons) from chemical and other industrial manufacturing firms, then processed the wastes to reclaim marketable products, such as methanol, which were sold to the originating companies. In addition, other liquid hydrocarbons were processed to some extent, then blended with fuel oil, and the mixtures were typically sold back to the originating companies, or to cement and aggregate kilns, as boiler fuel.

In addition to the wastes noted above, the site also received other items, including paint sludges and acids, although it is not clear just what was intended in terms of their processing/disposition.

Cessation of operations at the site was ordered by the New Jersey Superior Court in 1980. At the time of the court-ordered shutdown, over 300,000 gallons of hazardous materials were stored on the site (Reference 3).

Site Layout

The site occupies a relatively flat, sparsely-vegetated area of approximately 5.9 acres. It is fenced on three sides (east, west, south), with the main entrance gate located on Paterson Plank Road, near the southeast corner of the site. Most operations were conducted in three sections of the site (Figure 1-2):

- Tank farm
- Still and boilerhouse
- Staging platform and thin-film evaporator

The tank farm has an unlined containment area that is depressed 1-2 feet with respect to the surrounding surface elevation. At one time, the tank farm contained 18 tanks. Presently, only four tanks remain at the site, and are currently being removed. These tanks are marked as containing PCB's. The structural integrity of these tanks is suspect. Streaks of discoloration appear on the sides of several of the tanks. At least two tanks have been patched with epoxy sealants and makeshift wooden braces have been installed for additional support. Leaks have been reported from one or more of these tanks by USEPA and NJDEP.

The drum storage areas are now vacant, after nearly 4,000 drums were reportedly removed to the firm's Newark site sometime between May 1979 and December 1980. These drum storage areas, comprising the southeastern half of the site, are unlined and have no spill containment provisions, although a concrete pad exists in one drum storage area.

The still and boilerhouse section of the site contained tank trailers used to receive and feed substances run through the still. USEPA and NJDEP reported that the structural integrity of the tanks on the tank trailers (which have been removed off-site) was also suspect, with discoloration indicating the possibility of leaks. Furthermore, one of the removed trailer tanks was heavily patched with epoxy sealants and makeshift wooden braces. The former still site is surrounded by a small dike, but the trailer parking slots are not. The ground is covered by stones with a pink coloration that may indicate past spillage.

The staging platform was used for transferring and storing wastes. The thin-film evaporator and adjoining small tank farm, which contained 10 tanks, are surrounded by a cinderblock dike which is broken in several places. A trailer tank was located southeast of the small tank farm, and was marked as containing PCB's.

Additional features on the site include:

- Two abandoned small buildings near the site entrance reportedly used as a garage and office;

- Two apparent sludge disposal areas near the northeastern corner of the site (a 1979 aerial photograph shows a lagoon or sludge pit in the northwest quadrant of the site);

- The cut portion of tank buried near the tank farm (contents and configuration unknown);

- A few soil and miscellaneous debris mounds, possibly generated during the initial remedial measures and the dismantling of the facility;

- Miscellaneous debris, including crushed drums, strewn throughout the site;

- Some seeps of discolored ground water discharging into the Peach Island Creek, observed by Dames & Moore personnel during a July 1985 site visit; and

- Patches of discolored soil at various locations throughout the site.

<u>Dames & Moore Activity</u>

Dames & Moore will supervise surveying, drilling and monitoring well installation at the site. Soil drilling will be conducted using a hollow-stem auger, rotary wash or air rotary drilling rig and soil sampling will be conducted using a split-spoon sampler. The borings will be converted to monitoring wells to facilitate ground water sampling. Dames & Moore will collect soil samples from shallow and deep borings as well as ground water samples from monitoring wells and surface water samples from creeks.

000490

3.3 FACILITY DESCRIPTION

Waste Types: Liquid _X_ Solid ___ Sludge _X_ Gas ___

Characteristics: Corrosive ___ Ignitable _X_ Radioactive ___

Volatile _X_ Toxic _X_ Reactive ___ Unknown ___

Unusual Site Features (dike integrity, power lines, terrain, etc.)

None

Status: (active, inactive, unknown) Inactive

3.4 HAZARD EVALUATION

The only known analytical data available regarding the SCP Site pertains to the sludge floating in the Peach Island Creek and soils collected from spill areas near the thin film evaporator. The results are shown in Table 7-1 in the text. This table is not a comprehensive list of site contaminants, as the types and possible concentrations of all contaminants at the site are unknown and could be diverse.

Consequently, the hazards to site personnel during the performence of drilling and sampling activities are quite variable and will require close attention to be paid to site safety and monitoring. The site will also be scrutinized.

000491

TABLE 1

EXPOSURE LIMITS AND RECOGNITION QUALITIES

Compound	Exposure Standard[1] (ppm, unless otherwise indicated)	IDLH (ppm, unless otherwise indicated)	Recognition Qualities: Odor	LEL % ppm	Ionization Potential
Acetone	750	20,000	Mint	2.6	9.69
Benzene	10	2,000	Aromatic	1.37	9.30
Butanol	150	10,000	Pleasant (15 ppm)	1.7	10.04
Butyl Acetate	150	10,000	Fruity	1.7	10.37
Carbon Tetrachloride	5	300	Ether-like	Not Combustible	11.47
Chloroform	2	1,000	Sweet Etheral	—	11.42
1,1 Dichloroethane	100	4,000	Sweet	6.0	
1,1 Dichloroethylene (Vinylidene Chloride)	5	4,000	Sweet	6.2	
Dimethyl-formamide	10	3,500	Ammonia-like	2.2	
Di-n-butyl phthalate	5 mg/m^3	9,300 mg/m^3	Weak Aromatic	—	
Dipropylene Glycol Methyl Ether	100	NA	Weak	?	
Ethyl Acetate	400	10,000	Fruity	2.2	10.11
Ethylbenzene	100	2,000	Aromatic	1.0	8.76
Glycol Monoethyl Ether	5	NA	Sweet		
Hexane	50	5,000	Gasoline	1.1	10.18
Isopropanol	400	20,000	Rubbing Alcohol	2.0	10.16
Methanol	200	25,000	Pungent	6.7	10.85
Methylene Chloride	100	5,000	Sweet	12.0	11.35
Methyul Isobutyl Ketone	50	—	Pleasant	7.0	9.30
Oil	NA	NA	Varies	.06	
PCB 42% Chlorine	1.0 mg/m^3	10 mg/m^3	Mild Hydrocarbon	—	
PCB 54% Chlorine	0.5 mg/m^3	5 mg/m^3	Mild Hydrocarbon	—	
Perchloroethylene (PCE)	50	500	Sweet	—	9.32
Phenol	5	100	Sweet	1.7	
Sodium Hypochlorite	100	NA	Sweet	—	
Tetrahydrofuran	200	20,000	Ether-like	2.0	9.54
Toluene	100	2,000	Aromatic (40 ppm)	1.3	8.82
1,1,1 Trichloroethane	350	1,000	Sweet (330 ppm)	7.0	
Trichloroethylene	50	1,000	Sweet (50 ppm)	11.0	8.45
Triethylamine	10	1,000	Fishy	1.2	7.50
Xylene	100	2,000	Aromatic	1.1	8.56
Zinc Chloride (fume)	1 mg/m	200 mg/m^3	None	Not Combustible	

NOTES:

1. OSHA permissible exposure limits (ACGIH Threshold Limit Value).
2. NA - Not Available.

TABLE 2

SYMPTOMS OF OVEREXPOSURE AND FIRST AID TREATMENT

	Symptoms of Overexposure			
Compound	Eye	Skin	Acute Effects	Chronic Effect
Benzene	Irritation	Dermatitis	Giddy, headache, nausea, fatigue, staggering gait	Leukemia
Xylene	Irritation	Permatitis	Dizziness, incoordination, nausea	
Toluene	—	Dermatitis, drying	Fatigue, confusion, dizziness, headache, nervousness	
Perchloroethylene	Irritation	Irritation	Moderate systemic toxicity	
1,1-Dichloroethane	Moderate Irritant	Moderate Irritant	Moderate chronic toxicity	
Chloroform	Moderate Irritant	Moderate Irritant	High acute toxicity	Suspected Carcinoger
1,1-Dichloroethylene	Irritation	Irritation	Dizziness, difficult breathing	
1,1,1-Trichloroethane	Irritation	Irritation	Nausea, incoordination, loss of equilibrium	
Trichloroethylene	Irritation	Irritation	nausea, vomiting, difficult breathing	
Acetone	Irritation	Irritation	Headache, dizziness, nausea, respiratory tract	
Carbon Tetrachloride	Intense Irritation	Irritation	Drowsiness, dizziness, loss of coordination, long-term kidnes and liver damage	Suspected Carcinoger
PCB (42% Chlorine)	Irritation	Chloroacne	Nausea, edema of the face and hands, abdominal pain, anorexia	
PCB (54% Chlorine)	Irritation	Chloroacne	Jaundice, dark urine	
Zinc Chloride (fume)	Corrosive	Severe Irritation	Nausea, respiratory tract irritation, acute pulmonary edema	
Methylene Chloride	Irritation	Irritation	Fatigue, weakness, sleepiness, numbness, nausea	
Methanol	Irritation	Irritation	Headache, drowsiness, nausea, vomiting, visual disturbances	
Isopropanol	Irritation	Drying	Drowsiness, nausea	
Dimethyl Formamide	—	Strong Irritant	Strong irritant to skin and tissue	
Di-n-butyl phthalate	Conjunctivitis	—	Sore throat, nausea, tearing eyes	Kidney Damage
Hexane	—	—	Broncitis, numbness of extremities, walking difficulties	
Butanol	Conjunctivitis	Dermatitis	Sore throat, dizziness	Paralysis
Glycol Ether			Toxic by ingestion only	
Ethyl Acetate	Irritation	Dermatitis	Sore throat, narcosis	

Butyl Acetate	Irritation	Dermatitis	Sore throat, headache, anorexia, nausea	
Tetrahydrofuran	Irritation	Irritation	Nausea, dizziness, headache, respiratory irritation	
Dipropylene Glycol	—	—	Toxic by ingestion only	
Triethanolamine	Irritation	Dermatitis	Sense of euphoria, headache, dizziness, abdominal cramps, sweating, cardiac depression, narcosis	Kidney Damage
Methyl Isobutyl Ketone	Irritation	Drying	Nose, throat, mucous membrane irritation, headache, nausea	
Octyl Phenol	Irritation	Irritation	Nose and throat irritation, muscle aches, dark urine	Liver and Kidney Dam
Sodium Hydochlorite	—	—		
Oil	Irritation	Irritation	Headache, giddiness, nausea, vomiting, cramping, sore throat	

<u>General First Aid Treatment</u>

Eye	Irrigate Immediately
Skin	Soap Wash Promptly
Inhalation	Move to Fresh Air
Ingestion	Get Medical Attention
See Page 8	Minor Accidents

4.0 EMERGENCY INFORMATION

4.1 EMERGENCY CONTACTS

Contact	Person or Agency	Telephone Work	Telephone Home
Police(1)		438-4300	
Fire(1)		438-4300	
Ambulance		438-4300	
Hospital(1)	Riverside General Hospital	348-9300 or 9334	
Poison Control		1-800-962-1250	
Client Contact	Thomas Armstrong	203-373-2282	
D&M Project Manager	G. Coscia	201-272-8300	201-577-0375
D&M MPIC/Group Leader	W. Mercurio	201-272-8300	
Office Safety Coordinator	Christina Grill	201-272-8300	
Regional H&S Manager	W. Levitan (acting)	301-652-2215	
Firmwide H&S Director	Leslie Birnbaum	914-735-1200	914-783-0026

4.2 LOCATION OF SITE RESOURCES

Water Supply: Building on-site by gate entrance

Telephone: Building on-site by gate entrance

Radio: ______

Other: ______

4.3 EMERGENCY ROUTE TO HOSPITAL

East on Patterson Plant to NJ 205
Then Take NJ 3 E to Meadowland Parkway 5
Riverside General Hospital is on the Right (See Map)

Note:
(1) Local officials shall be contacted prior to initiation of work.

4.4 ADDITIONAL ARTICLES TO BE TAKEN INTO FIELD

1. First Aid Kit

2. Disposable Eye Wash (1 liter or more) (Will be located on the "Hot" side of the contamination reduction zone or work area).

3. Fire Extinguisher

4. Air Horn

5. Emergency Shower will be set up in the building located on the "clean side" of the contamination reduction area.

5.0 SITE SAFETY WORK PLAN

5.1 MONITORING

5.1.1 Monitoring Requirements

Air monitoring will be conducted for all hazards presented in Table 1. Equipment necessary for monitoring at this site consists of OVA/PID, detector tubes, and O_2 explosimeter. The type of monitoring instruments specified by the hazard and the action levels to upgrade personal protection is shown on Table 3. All monitoring equipment shall be maintained following procedures outlined in the D&M Standard Operating Manual for Monitoring Equipment.

000496

5.1.2 Monitoring Schedule

5.1.2.1 Instrument Calibration

All applicable instruments shall be calibrated daily. Readings shall be recorded on the Instrument Calibration Check Out Sheet provided in Section 6.0.

5.1.2.2 Background Readings

Before any field activities commence, the background levels of the site will be read and noted. Daily background readings shall take place away from areas of potential contamination to obtain accurate results.

5.1.2.3 Air Monitoring Frequency

All site readings shall be noted on the Air Monitoring Form provided in Section 6.0 along with the date, time background level, weather conditions, wind direction and speed, and location where the background level was recorded.

000497

TABLE 3

HAZARD MONITORING METHOD, ACTION LEVELS, AND PROTECTIVE MEASURES

Hazard	Monitoring Method	Action Level	Protective Measures	Monitoring Schedule
		(1) Measurable above background		
	OVA/PID (10.2 eV)	up to 5 ppm and	Don full-face respirator with organic vapor/high efficiency dust and mist cartridge	o Continue drilling
	*Chloroform Detector Tubes	< 2 ppm and		o Continuous monitoring/ every sample retrieved
	*Carbon Tetrachloride Detector Tubes	< 5 ppm	Level C (See Table 4)	
		Measurable above background		
	OVA/PID (10.2 eV)	5 ppm - 500 ppm or	STOP WORK - EVACUATE AREA NOTIFY PROJECT MANAGER	
	Chloroform Detector Tubes	> 2 ppm or		
	Carbon Tetrachloride Detector Tubes	> 5 ppm		
Toxic Dust	Visual	Dusty Conditions	Don full-face respirator with organic vapor and high efficiency dust and mist cartridges	
Explosive Atmosphere	Explosimeter	0 - 10% LEL	Continue drilling	o Continue monitoring every 10 minutes/ every sample retrieved
		10% - 25% LEL		o Continuous monitoring/ every sample retrieved
		> 25% LEL	EVACUATE THE AREA** EXPLOSION HAZARD	
	O_2 Meter	19.5% + < 25%		o Continue
		19.5% or > 25%	EVACUATE AREA	

(1) The above Action Levels are not solely based on the criteria for selecting levels of protection by the 1984 EPA Standard Operating Procedures, but also on the professional judgement and experience of the On-site Safety Officer (OSSO).

* Chloroform and carbon tetrachloride are not sensitive to the 10.2 ultraviolet lamp of the PID.

** If encountered in a boring hole or monitoring well, purge boring or well with nitrogen until safe levels (< 10%) are obtained. If 25% LEL persists, abandon boring and evacuate area temporarily. After at least 1/2 hour, re-approach borehole from an upwind direction while continuously monitoring well explosimeter. If levels are still unsafe, backfill hole and abandon.

The following schedule shall be followed for air monitoring activities as specified for each activity.

Activity:

Equipment	Monitoring Frequency	
GCI	Continuously/Daily/Other	Every 10 minutes every sample retrieved
O_2 Meter	Continuously/Daily/Other	Every 10 minutes/ every sample retrieved
Colorimetric Tubes	Continuously/Daily/Other	Every 10 minutes/ every sample retrieved
Type		
Chororform	Continuous/Daily/Other	Every 10 minutes/ every sample retrieved
Carbon Tetrachloride	Continuous/Daily/Other	Every 10 minutes/ every sample retrieved
____________	Continuously/Daily/Other	________________
HNU/OVA	Continuously/Daily/Other	Every 10 minutes/ every sample retrieved
Other ________	Continuously/Daily/Other	________________

5.2 LEVELS OF PROTECTION

The level of protection needed to perform work on-site is D+ or C and is described on the next page in Table 4.

5.3 RESPORATORY PROTECTION

5.3.1 Types of Cartridge/Limits of Cartridges

If air purifying respirators are authorized, organic vapor and high efficienty dust and mist cartridges are the appropriate cartridges for use with the involved substances and concentrations. A competent individual has determined that all criteria for using this type of respiratory protection has been met of these specified cartridges to provide protection up to 500 ppm. If the air contaminates are identified as chloroform or carbon tetrachloride, or if air concentrations exceed 5 ppm, evacuate the site and notify the Project Manager.

000499

TABLE 4

PROTECTIVE EQUIPMENT FOR ON-SITE ACTIVITIES

Activity	Level	Protective Equipment
Site Surveying, Geophysical Surveying	D	o Coveralls o Boots/shoes, leather or chemical resistant o Gloves (optional)
Drilling, Soil and Ground Water Sampling(1)	D+	o Safety glasses o Chemical-resistant (Tyvek) clothing o Outer (chemical-resistant) and inner (chemical-resistant) gloves o Steel-toed boots (chemical-resistant) o Neoprene or butyl rubber outer boots o Hard hat
Drilling, Soil and Ground Water Sampling(1)	C	o Same as above plus o Joints between gloves, boots and suit shall be taped o Full-face respirator with organic vapor/high-efficiency dust and mist cartridges(2) o If PID readout is greater than 5 ppm or Chloroform Detector Tube reading is greater than 2 ppm or Carbon Tetrachloride Detector Tube is greater than 5 ppm: STOP WORK - EVACUATE AREA NOTIFY PROJECT MANAGER

(1) The level of protection for ground water sampling will be modified after the analytical analysis of the ground water samples has been received from the laboratory.

(2) If OVA/PID reading is measurable above background up to 5 ppm or Dusty conditions exist.

Notes:

Chloroform and carbon tetrachloride are not sensitive to the 10.2 ultraviolet lamp of the PID.

5.4 WORK LIMITATIONS

In general, field work will be conducted during daylight hours only. At least two personnel will be in the field at all times. The PM or RHSC must grant special permission for any field activities conducted beyond daylight hours. All personnel working in the field shall complete the D&M CIP (or its equivalent) and been declared fit for duty and where respiratory protection is necessary have been properly trained, fit tested and declared for respirator use.

5.5 FIELD PERSONNEL

Work party consisting of two persons will perform the following tasks:

Site Project Manager	Bruce Scarbrough
Site Safety Officer	Christina Grill
Work Party #2	______________________________
Work Party #3	______________________________

The work party(s) were briefed on the contents of this plan on __________ at ______________________.

6.0 DECONTAMINATION PROCEDURES

1. Locate a decontamination area between the Hot Line (upwind boundary of the Exclusionary Area) and the Clean Area boundary.

2. Establish a personnel decontamination station (PDS).

3. Upon leaving the contamination area, all personnel will proceed through the appropriate Contamination Reduction Sequence.

4. All protection gear should be left on-site during lunch break following decontamination procedures.

000501

The maximum decontamination layout for Level C is shown in the attached diagram and a description is given below.

Maximum Measures for Level C Decontamination

Station 1:	Segregated Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Boot Cover and Glove Wash	2. Scrub outer boot covers and gloves with decon solution or detergent and water.
Station 3:	Boot Cover and Glove Rinse	3. Rinse off decon solution from Station 2 using copious amounts of water.
Station 4:	Tape Removal	4. Remove tape around boots and gloves and deposit in container with plastic liner.
Station 5:	Boot Cover Removal	5. Remove boot covers and deposit in containers with plastic liner.
Station 6:	Outer Glove Removal	6. Remove outer gloves and deposit in container with plastic liner.
Station 7:	Suit and Boot Wash	7. Wash splash suit, gloves, and safety boots. Scrub with long-handle scrub brush and decon solution.

Station 8:	Suit and Boot, and Glove Rinse	8. Rinse off decon solution using water. Repeat as many times as necessary.
Station 9:	Canister or Mask Change	9. If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and joints taped worker returns to duty.
Station 10:	Safety Boot Removal	10. Remove safety boots and deposit in container with plastic liner.
Station 11:	Splash Suit Removal	11. With assistance of helper, remove splash suit. Deposit in container with plastic liner.
Station 12:	Inner Glove Wash	13. Rinse inner gloves with water.
Station 13:	Inner Glove Rinse	12. Wash inner gloves with decon solution.
Station 14:	Face Piece Removal	14. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers.
Station 15:	Inner Glove Removal	15. Remove inner gloves and deposit in lined container.
Station 16:	Inner Clothing Removal	16. Remove clothing soaked with perspiration and place in lined container. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the disposable coveralls.

Station 17: Field Wash

17. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.

Station 18: Redress

18. Put on clean clothes.

Minimal Decontamination

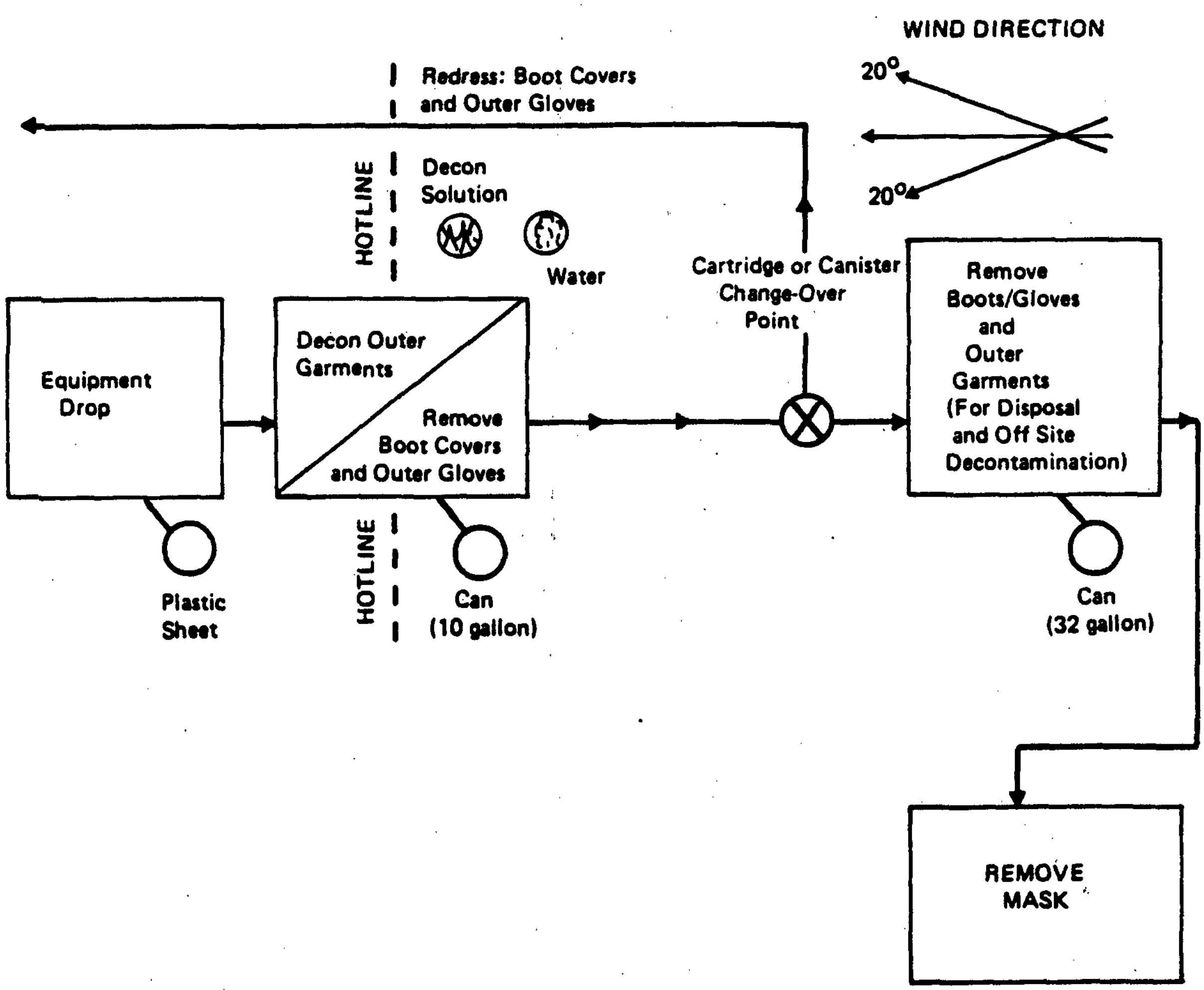
Less extensive procedures for decontamination can be subsequently or initially established when the type and degree of contamination becomes known or the potential for transfer is judged to be minimal. These procedures generally involve one or two washdowns only. The layout for a minimal decontamination operation is shown in the attached diagram.

Closure of the Personnel Decontamination Station

All disposable clothing and plastic sheeting used during the operation should be double-bagged and either contained on-site or removed to an approved off-site disposal facility. Decon and rinse solution could be contained on-site or removed to an approved disposal facility. Reusable rubber clothing should be dried and prepared for future use. (If gross contamination had occurred, additional decontamination of these items may be required.) Cloth items should be bagged and removed from the site for final cleaning. All wash tubs, pail containers, etc., should be thoroughly washed, rinsed, and dried prior to removal for the site.

MINIMUM DECONTAMINATION LAYOUT

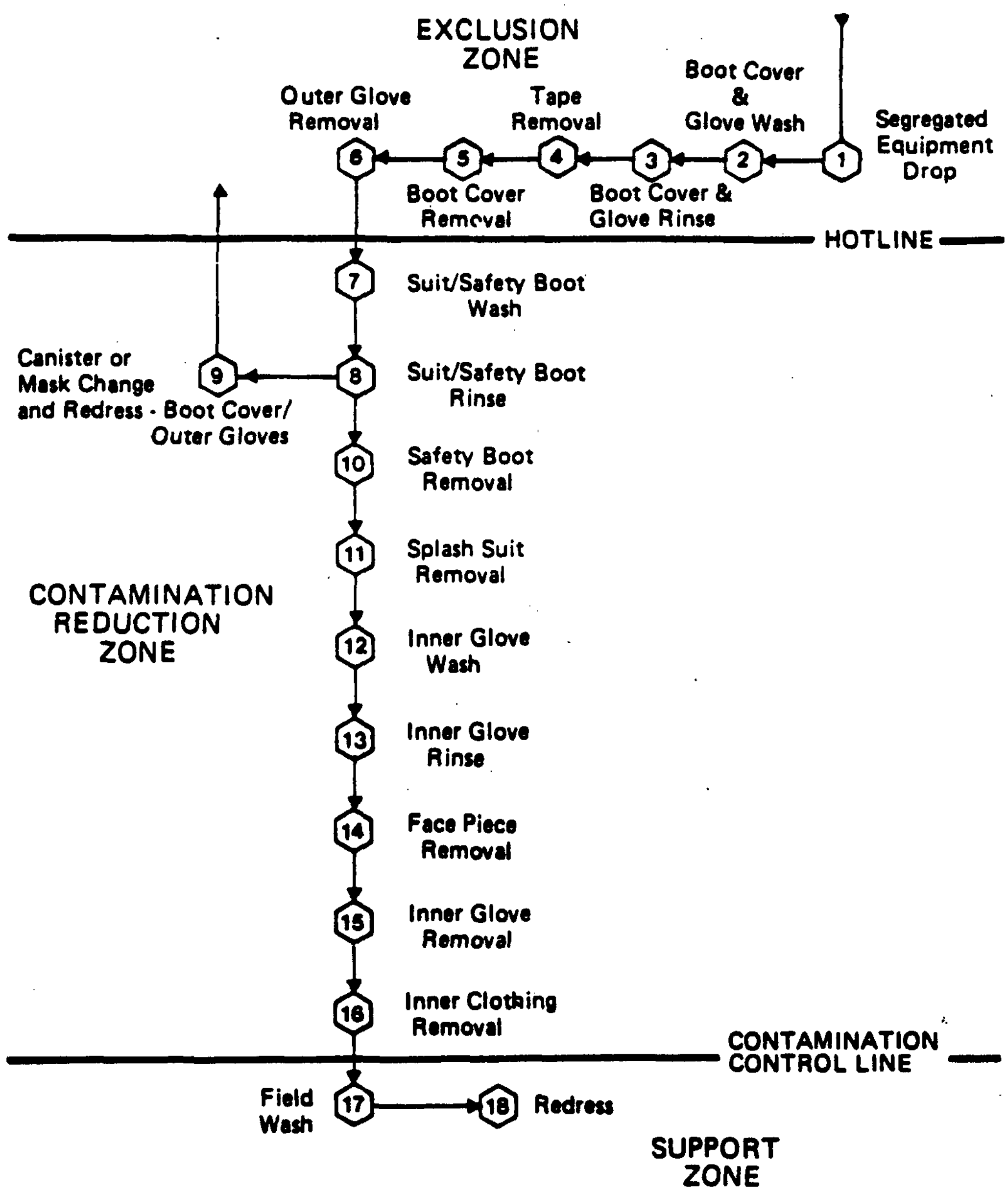
LEVEL C PROTECTION



000505

MAXIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION



000506

7.0 FORMS

The following forms are enclosed in this section:

Plan Feedback Form
Accident Report Form
Exposure Form (to be completed by PM only)
Calibration Check Sheet

The Plan Acceptance Form should be filled out by all employees working on the site. The Plan Feedback Form should be filled out by the on-site safety officer and any other on-site employee who wishes to fill one out. The Accident Report Form should be filled out by the Project Manager in the event that an accident occurs.

ALL COMPLETED FORMS SHOULD BE RETURNED TO THE FIRMWIDE HEALTH AND SAFETY PROGRAM OFFICE.

000507

EXPOSURE HISTORY FORM

(To be Completed by Project Manager)

Job Name ______________________________

Job Number: ______________________________

Dates From/To: ______________________________

D&M Personnel On-Site

1. ____________	5. ____________
2. ____________	6. ____________
3. ____________	7. ____________
4. ____________	8. ____________

Suspected Contaminants	Verified Contaminants and Airborne Concentration Thereof

Return to: (1) OSC (2) WRHSO (In Western Region) (3) FHSPO

000508

DAILY INSTRUMENT CALIBRATION CHECK SHEET

INSTRUMENT: ______________________

SERIAL # ______________________

DATE	PURE AIR Y/N	CALIBRATION GAS (PPM)	BATTERY CHECK (GOOD/BAD)	CALIBRATED BY	REMARKS

AIR MONITORING

GENERAL INFORMATION

Name(s): ____________________ Background Level: ____________________

Date: ____________________ Weather Conditions: ____________________

Time: ____________________ ____________________

Project: ____________________ ____________________

Job No: ____________________

Estimated Wind Direction: ____________________

Estimated Wind Speed (i.e., calm, moderate, strong, etc): ____________________

Estimated Air Temperature and % Relative Humidity: ____________________

Location Where Background Level Was Obtained: ____________________

EQUIPMENT SETTINGS

HNU

Range: ____________________

Span Pot: ____________________

Calibration GAs: ____________________

EXPLOSIMETER

Alarm Trigger-%LEL : ____________________

Alarm Trigger-%02 : ____________________

Calibration GAs: ____________________

FIELD ACTIVITIES

Field Activities Conducted: ____________________

____

TIME	HNU	EXPLOSIMETER %LEL	EXPLOSIMETER %02	DRAGER TUBE	RADIATION METER
	Equivalent			ppm-constituent	

000510

PLAN ACCEPTANCE FORM

PROJECT HEALTH AND SAFETY PLAN

Instructions: This form is to be completed by each person to work on the subject project work site and returned to the Program Director-Firmwide Health & Safety Program Office.

Job No. __________________________________

Client Project: __________________________________

Date __________________________________

I represent that I have read and understand the contents of the above plan and agree to perform my work in accordance with it.

____
Signed

____
Print Name

____
Company/Office

____
Date

PLAN FEEDBACK FORM

Job Number: 14485-002-10

Job Name: SCP Carlstadt

Date: March 1987

Problems with plan requirements:

Unexpected situations encountered:

Recommendations for future revisions:

PLEASE RETURN TO THE FIRMWIDE HEALTH AND SAFETY OFFICE
(Pearl River, New York)

Site Safety Briefing Forms

ON-SITE SAFETY MEETING

Project ______________________________

Date ______________ Time ______________ Job No. ______________

Address ______________________________

Specific Location ______________________________

Type of Work ______________________________

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment ______________________________

Chemical Hazards ______________________________

Emergency Procedures ______________________________

Hospital/Clinic ______________________________ Phone ______________

Hospital Address ______________________________

Special Equipment ______________________________

Other ______________________________

ATTENDEES

Name Printed	Signature

Meeting Conducted By: ______________ Name Printed ______________ Signature

Site Safety Officer ______________ Team Leader ______________

CCC512

APPENDIX A

Chemical Hazard Evaluation

(MATERIAL SAFETY DATA SHEETS ARE MAINTAINED
IN THE PROJECT FILES.)

APPENDIX B

RESPONSIBILITIES

B.1 PROJECT MANAGER

The Project Manager (PM) shall direct on-site investigations and operational efforts. The PM, assisted by the Site Safety Coordinator (SSC), has primary responsibility for:

1. Making certain that appropriate personnel protective equipment and monitoring equipment is available and properly utilized by all on-site personnel;

2. Making certain that personnel receive this plan and are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies;

3. Making certain all field personnel have had a minimum of 40 hours training;

4. Making certain that personnel are aware of the potential hazards associated with site operations;

5. Monitoring the safety performance of all personnel to ensure that the required work practices are employed;

6. Correcting any work practices or conditions that may result in injury or exposure to hazardous substances;

7. Preparing any accident/incident reports (see attached Accident Report Form); and

8. Assuring the completion of Plan Acceptance and Feedback Forms attached hereto.

B.2 ON-SITE SAFETY OFFICER

The On-Site Safety Officer (OSSO) shall:

1. Implement project Health & Safety Plans and report to the Site Safety Coordinator and the PM for action if any deviations from the anticipated conditions described in the plan and has the authorization to stop work at any time;

2. Calibrate all monitoring equipment on a daily basis and record results on the attached sheets: (See Appendix - Daily Instrument Calibration check sheet.)

3. Making certain that all monitoring equipment is operating correctly according to manufacturers instructions and provide maintenance if it is not;

4. Confirm that personnel working on-site have the proper medical surveillance program and Health & Safety training which qualifies them to work at a hazardous waste site. Also be responsible for identifying all WMS site personnel with special medical problems (i.e. allergies).

8.3 PROJECT PERSONNEL

Project personnel involved in on-site investigations and operations are responsible for:

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees;

2. Performing only those tasks that they believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the SSC;

3. Notifying the PM and SSC of any special medical problems (i.e. allergies) and making certain that all on-site personnel are aware of any such problems.

APPENDIX C

STANDARD SAFE WORK PRACTICES

C.1 GENERAL

1. Eating, drinking, chewing gum or tobacco and smoking are prohibited in the contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.

2. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surface (i.e. ground, etc.).

3. Prevent, to the extent possible, spillage. In the event that a spillage occurs, contain liquid, if possible.

4. Prevent splashing of contaminated materials.

5. All field crew members shall make use of their sense (<u>all senses</u>) to alert them to potentially dangerous situations in which they should not become involved (i.e. presence of strong, irritating or nauseating odors).

6. Field crew members shall be familiar with the physical characteristics of investigations, including:

   - o Wind direction in relation to the ground zero area;
   - o Accessibility to associates, equipment, vehicles;
   - o Communications;
   - o Hot zone (areas of known or suspected contamination);
   - o Site access;
   - o Nearest water sources.

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7. The number of personnel and equipment in the contaminated area should be minimized, but only to the extent consistent with workforce requirements of safe site operation.

8. All wastes generated during D&m and/or subcontractor activities at the site will be disposed of as directed by the PM.

C.2 DRILLING AND SAMPLING PROCEDURES

For all drilling and sampling activities, the following standard safety procedures shall be employed:

1. All drilling and sampling equipment shall be cleaned before proceeding to the site.

2. At the drilling or sampling site, sampling equipment shall be cleaned after each use.

3. Work in "cleaner" areas should be conducted first where practical.

4. The minimum number of personnel necessary to achieve the objectives shall be within 25 feet of the drilling or sampling activity.

5. If emergency and back-up subcontracted personnel are at the site, they should remain 25 feet from the drilling or sampling activity, where practical.

6. Exclusion zones will be established within designated hot lines. Delineation of a hot line will reflect the interface between areas at or below a perdetemined threshold contaminant concentation, based on available data including the results of monitoring and chemical analyses, information from site personnel regarding historical site activities, and general observations. This determination will be made by the PM in conjunction with the SSO and site personnel.

C.3 BOAT SAFETY PRACTICES (LAGOON SAMPLING)

1. Two persons will man the sampling boat and an on-shore supervisor will be present at all times.

2. All field personnel shall wear life preservers.

3. The on-shore supervisor should be equipped with in-plant communication in case an accident requiring emergency services occurs.

4. In-plant safety and medical personnel should have complete notification of the boat sampling schedule and locations.

5. A tow line will be attached to the boat and maintained on land at all times if practicable.

6. Boarding and unloading the sampling boat will be conducted from a dry and stable location if practible, without necessitating contact by personnel with the contaminated waste water.

7. Personnel shall position themselves accordingly in the boat to maintain a stable condition at all times (counter balancing bow and stern or port starboard).

8. Sampling equipment should be drained thoroughly before being brought into the boat.

9. If sampling equipment falls into the water, do not make any attempt to retrieve it.

C.4 DRILLING IN A LANDFILL

1. Specific monitoring methods and protective equipment indicated in Tables 3 and 4 should be utilized. Monitoring with detector tubes for H_2S, HCN, and vinyl chloride shall be carried out. Monitoring for exposure to CH_4 shall be conducted as well.

2. Established clean area just outside of the landfill consisting of a decontamination area as described in Section 5.7 and backup support health and safety and firefighting equipment (fire extinguishers). This area will be continuously monitored by the SSC who will have visual contact with personnel in the landfill and radio contact with the plant. In addition, the SSC will be prepared to enter the landfill in protection Level B protective gear in case of an emergency.

3. Prior to the start of drilling a probe within the landfill, a protective steel sheeting or blasting mat, about 20 feet by 10 feet will be lplaced over the area to be probed. The probe will be drilled through a hole cut in the center of the sheeting.

4. Appropriate emergency and backup subcontracted personnel should remain 25 feet from the drilling or sampling activity where practical.

4. Appropriate emergency and backup subcontracted personnel should remain 25 feet from the driling or sampling activity where practical.

C.5 CONFINED SPACE ENTRY

All personnel will treat Confined Space Entry as a special hazard, and all tanks, similar vessels and partially or entirely closed spaces shall be regarded as being potentially dangerous.

Before entering a confined space, the SSC must see that the following is adhered to:

1. All mechanical apparatus such as agitators and pumps within the confined space, which if actived, could injure the worker, is locked out.

2. The atmosphere within the confined space is tested for oxygen (O_2) deficiency and flammable gas or vapor, LEL, and the test results recorded.

The area will be continuously vented to dissipate any vapors or gases (five air changes are required). The percent O_2 and LEL will be redetermined and recorded and upon reaching safe levels, as indicated on the meter, the space may be entered. The area shall be continuously, positively (blow air in) ventilated prior to and during entry. The following equipment will be used in lieu of standard equipment.

A. Flashlights, lanterns or alternating current (AC) or direct current (DC) electric powered lighting which is approved for Class 1, Division 1, Group C or D Atmosphere (explosion-proof).

B. Hand tools constructed of non-sparking metal alloys.

3. Workers are provided and required to use protective equipment as follows:

A. For worker entering confined space:

- gloves
- rubber steel toed boots
- impermeable coveralls
- safety harness with attached lifeline
- excape packs
- hard hat with safety glasses.

B. For worker observing operation:

- hard hat
- safety glasses or goggles
- gloves
- boots and safety shoes
- impermeable coveralls
- immediate access to self-contained breating apparatus with full face mask
- immediate access to safety harness and lifeline
- two-way radio for summoning assistance and emergency communication.

4. D&M employees are not permitted to enter a confined space in which levels in excess of acceptable standards (see exposure standard in Health and Safety Plan) are present.

5. Air supply lines are inspected for leaks or cracks which could result in breakage during use. Face mask respirators are checked for proper flow rate. Two-way radios are tested to assure proper working order and reception of signal transmitted. Safety harnesses and eye lines are checked for proper integrity.

6. The permit should also contain the following information:

   A. name of person entering the confined space
   B. name of observer(s)
   C. date and time of entry
   D. reason for entry.

   This permit will be prominently displayed in the area of the continued space to be entered.

C.5 "BUDDY SYSTEM"

1. All operations involving confined space entry will be performed by a team of not less than two (2) persons with specific duties as follows:

   Person #1 — Securing of lifeline to winch or stationary object and entry into confined space to perform necessary operations(s). Maintain communication with Person #2.

   Person #2 — Remain outside the confined space and observe and/or communicate with Person #1 until the operation is complete and Person #1 has exited the confined space.

   During the period in which the confined space operation is being performed, Person #2 will b eequipped with a full-face positive pressure demand, self-contained breathing apparatus and safety harness with lifeline.

   Person #2 will tend to Person #1's lifeline during the entire operation.

2. Communications

Person #1 and Person #2 will communicate with each other during the entire operation, if isual contact cannot be maintained. The following code shall be used when utilizing the lifeline:

Person #2 to Person #1		Person #1 to Person #2	
1 Pull	- Are you okay?	1 Pull	- I am okay
2 Pulls	- Advance	2 Pulls	- I am going ahead
3 Pulls	- Back out	3 Pulls	- Keep slack out of line
4 Pulls	- Come out immediately	4 Pulls	- Send help

If Person #1 does not respond to the pull code, assume that there is trouble and begin effecting emergency procedures.

3. Emergency Plan

If it becomes necessary to effect rescue efforts to remove a worker from a confined space, the following procedures will be followed:

A. Person #2 will communicate via two-way radio to a base station and request assistance. The following information will be given:

1. Location

2. Bring emergency oxygen supply and first-aid kit.

3. Bring self-contained air supply with full face mask, safety harness, and lifeline.

4. Call for professional medical assistance.

BEFORE BEGINNING RESCUE, CONFIRM THAT COMMUNICATION WAS RECEIVED AS TRANSMITTED AND THAT ASSISTANCE IS FORECOMING.

B. If Person #1's lifeline is secured to a winch, begin hauling Person #1 out of the confined space. This procedure must be performed at speed that will not further injure Person #1.

C. If the lifeline is not secured to a winch, Person #2 will secure lifeline and enter the continued space, wearing SCBA.

ALWAYS SUMMON ASSISTANCE BEFORE BEGINNING A RESCUE ATTEMPT.

4. Reporting

Upon completion of the confined space entry operation, the permit should be completed indicating the amount of time the worker or workers were inside the confined space. This report (permit) is sent to RHSM.

APPENDIX D

D.1 CONTACTS

Should any situation of unplanned occurrence require outside or support services, the appropriate contacts should be made. The list of appropriate contacts is listed in Table 5.

D.2 PROCEDURES

In the event that an emergency develops on-site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- o Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on-site; or
- o A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

The following emergency procedures should be followed:

A. Personnel on-site should use the "buddy system" (pairs). Buddies should pre-arrange hand signals or other means of emergency signals for communication in case of lack of radios or radio breakdown (see the following item).

   - o Hand gripping throat: out of air, can't breathe.
   - o Grip partner's wrist or place both hands around waist: leave area immediately, no debate.
   - o Hands on top of head: need assistance.
   - o Thumbs up: okay, I'm alright, I understand.

- o Thumbs down: no, negative.

B. Site work area entrance and exit routes should be planned, and emergency escape routes delineated by the SSC.

C. Visual contact should be maintained between "pairs" on-site with the team remaining in close proximity in order to assist each other in case of emergencies.

D. In the event that any member of the field crew experiences any adverse effects of symptoms of exposure while on-site, the entire field crew should immediately halt work and act according to the instructions provided by the OSSO.

E. Wind indicators visible to all on-site personnel should be provided by the PM to indicate possible routes for upwind escape.

F. The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should results in the evacuation of the field team and re-evaluation of the hazard and the level of protection required.

G. In the event that an accident occurs, the PM is to complete an Accident Report Form for submittal to the Office Safety Coordinator (OSC), who will forward a copy to the RHSM and the FWHSD. The OSC should assure that the follow-up action is taken to correct the situation that caused the accident.

H. In the event that an accident occurs, the PM is to complete an Accident Report Form for submittal to the MPIC of the office, with a copy to the health and safety program office. the MPIC should assure that follow-up action is taken to correct the situation that caused the accident.

APPENDIX E

Heat Stress/Cold Stress

If site work is to be conducted during the winter, cold stress is a concern in the health and safety of the personnel. Table 4 lists additional insulated clothing that will be provided for field personnel. Appendix E provides a discussion of cold stress including determination of when cold stress (at what temperatures) becomes a problem and recommends work/break periods. Of special note for cold stress on this site is the wearing of tyvek suits. Disposable clothing does not breath; therefore, perspiration is not provided with a means of evaporation. During strenuous physical activity, an employee's clothes can become wet. Wet clothes combined with cold temperatures can lead to hypothermia. If the air temperature is less than 40° F and an employee becomes wet, the employee must change to dry clothes. The on-site heated trailer facility or a personnel vehicle may be utilized as a change area.

If site work is to be conducted during the summer, heat stress is a concern in the health and safety of the personnel. Persons required to wear tyvek coveralls will be allowed the following rest periods when wet bulb temperatures fall within the indicated ranges:

76-80°F	15 minutes each hour
80-85°F	30 minutes each hour
85-90°F	45 minutes each hour
over 90°F	No work

When the wet bulb globe temperature exceeds 75°F, the heart rate of each person who is working in field activities zone with tyvek suits will be taken when that person leaves the zone. If the heart rate of a person exceeds 90 plus his/her age in years or 160 beats per minute, steps will be taken to watch for and avoid heat-related illness. All persons working the field activities zone will be trained to recognize the signs and symptoms of heat-related illness and in methods of preventing and providing first aid for such illness.

Water will be made available to personnel and its use will be encouraged.

APPENDIX F

Respirator Care

Respirators belong, and are only used and maintained to by the individual to whom they have been issued. Eash D&M employee who anticipates working on-site shall be trained, fit-tested and declared medically fit to wear respiratory equipment prior to participating in field activities. Proper methods for respirator selection, use, and maintenance will be defined in the D&M Respiratory Protection Manual.

APPENDIX G

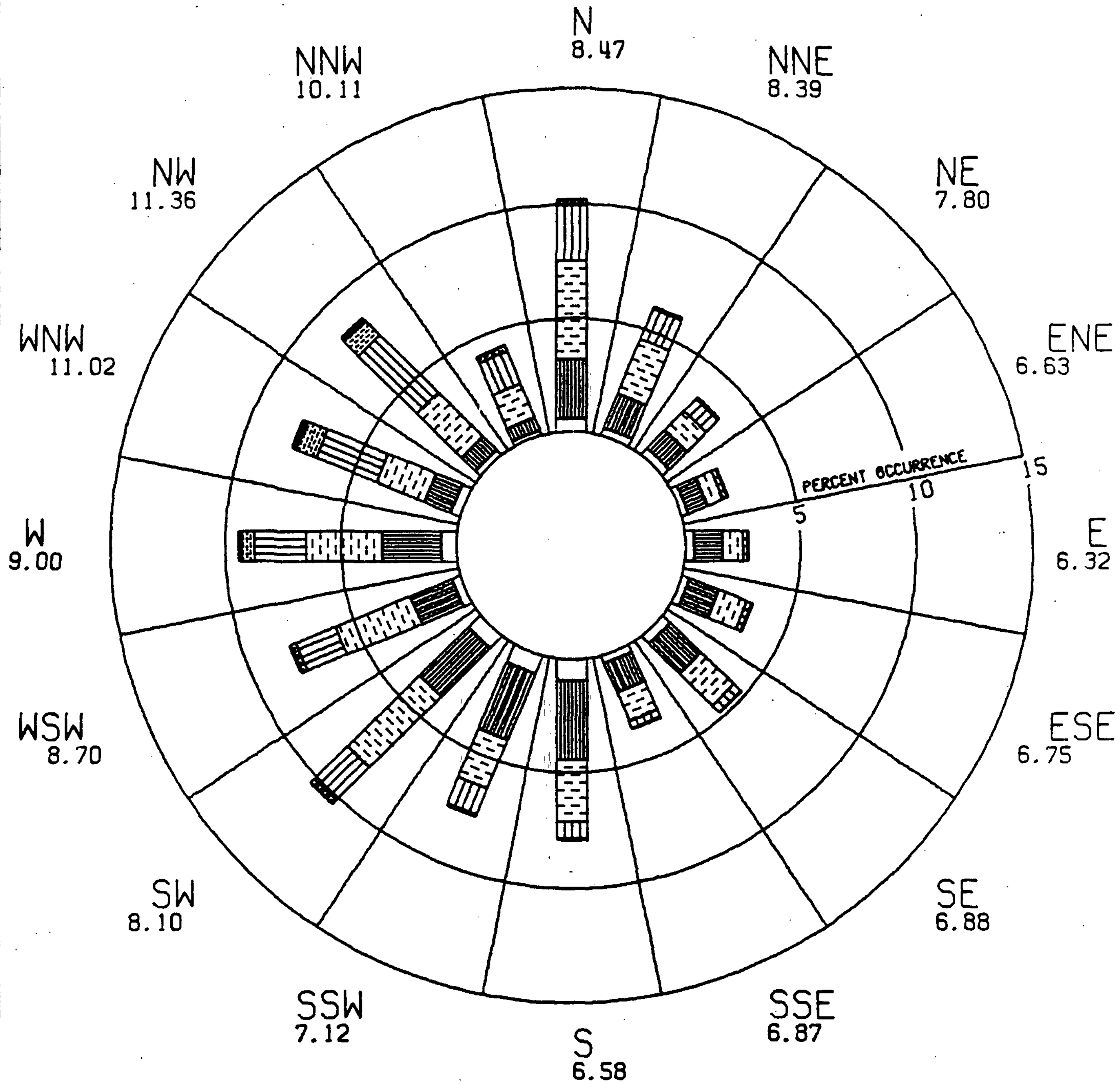
Certificate for Field Employees

A Fit for Duty Certificate, Training Certificate, and First Aid/CPR Certification of each employee working on this site shall be included in this section.

APPENDIX C

WIND ROSE DIAGRAMS

000529



SECTOR MEAN WIND SPEED (KNOTS)

WIND SPEED RANGE

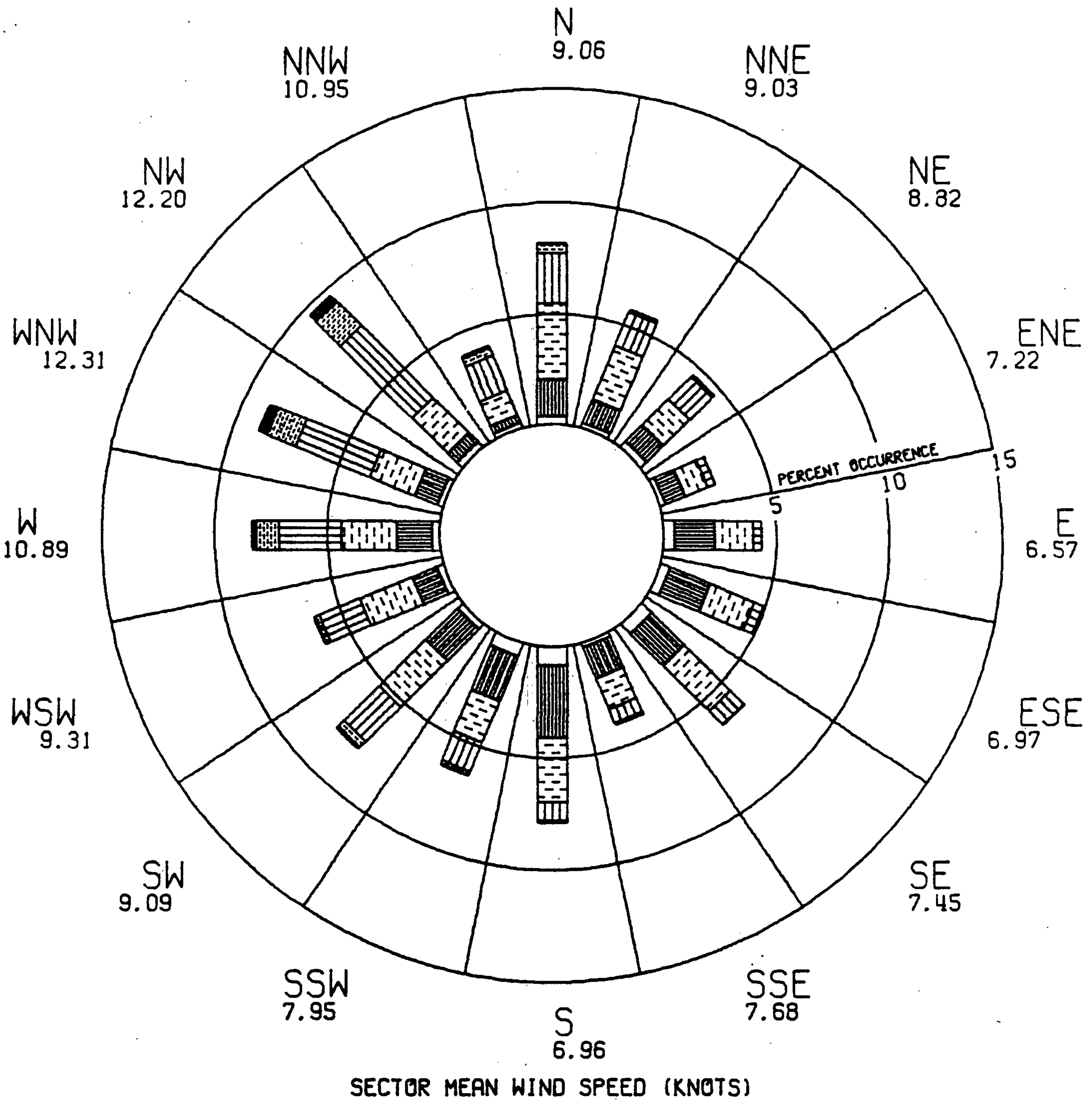
- 0- 3 KNOTS
- 4- 6
- 7-10
- 11-16
- 17-21
- › 21

NEWARK, NEW JERSEY

ANNUAL WIND ROSE (1972-1976)

000530

FIGURE C-1



WIND SPEED RANGE

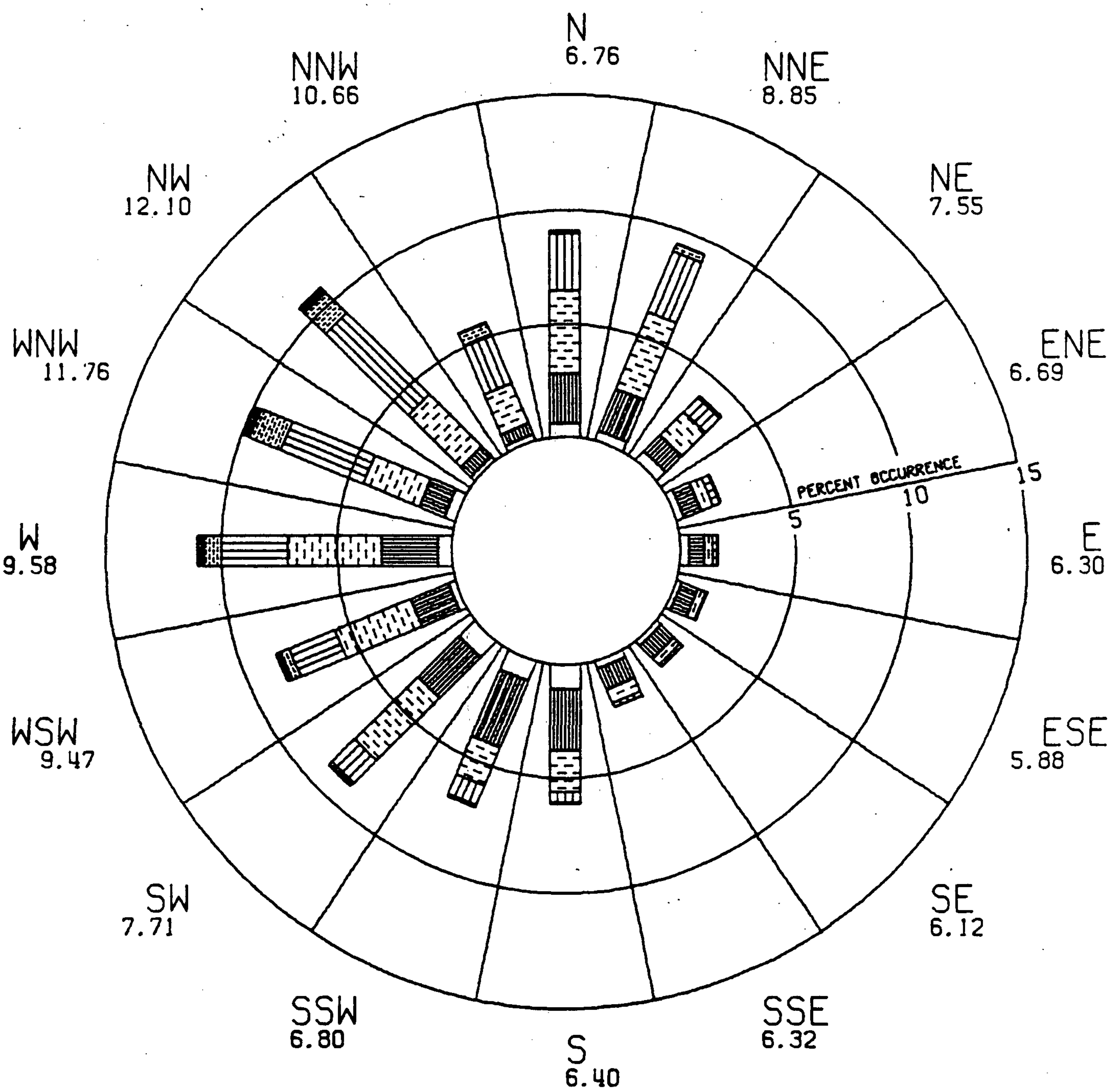
- 0- 3 KNOTS
- 4- 6
- 7-10
- 11-16
- 17-21
- › 21

NEWARK, NEW JERSEY

SEASONAL WIND ROSE (MAR-MAY)

CCC53

FIGURE C-3



SECTOR MEAN WIND SPEED (KNOTS)

WIND SPEED RANGE

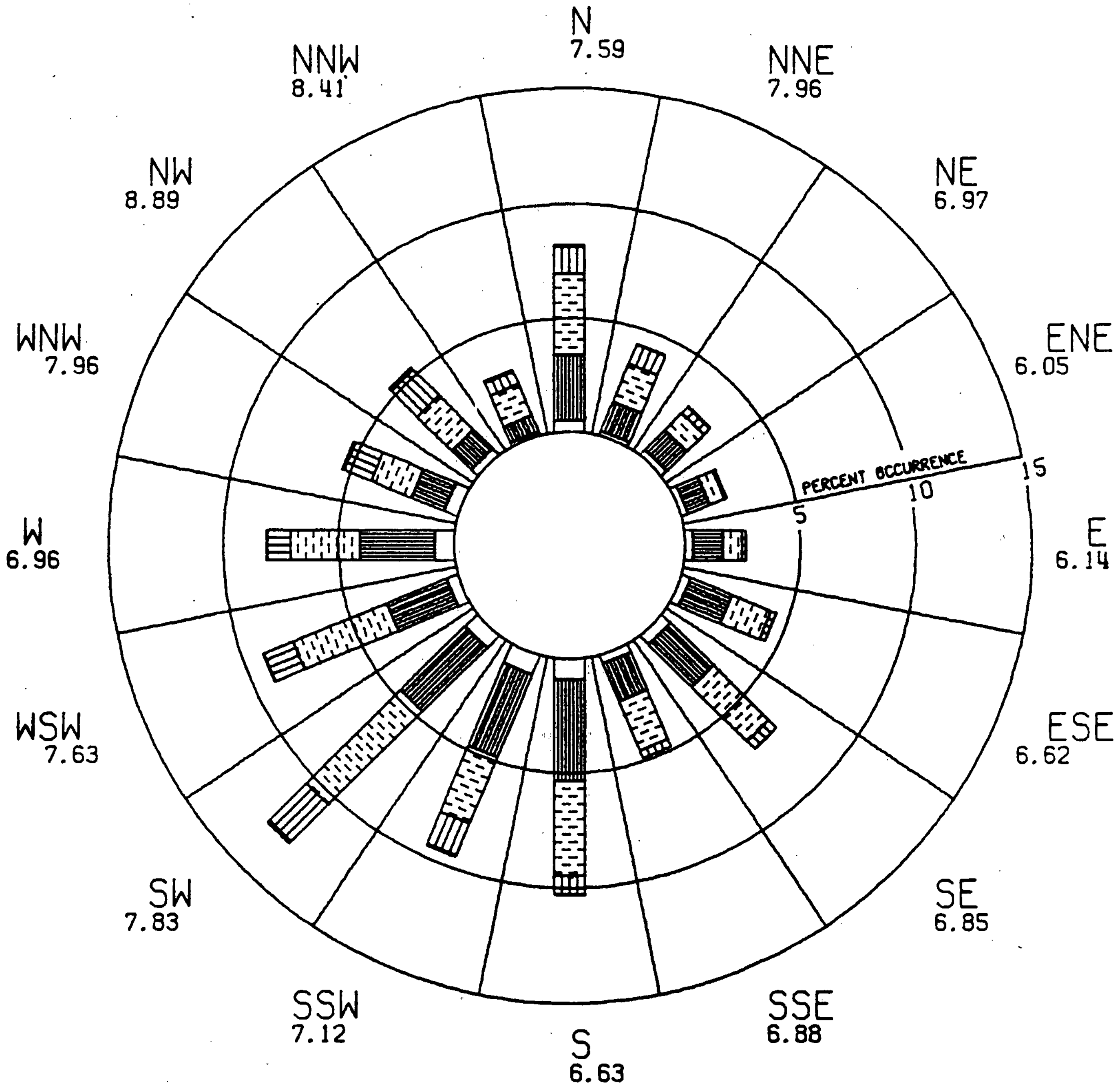
- 0- 3 KNOTS
- 4- 6
- 7-10
- 11-16
- 17-21
- › 21

NEWARK, NEW JERSEY

SEASONAL WIND ROSE (DEC-JAN)

000532

FIGURE C-2



SECTOR MEAN WIND SPEED (KNOTS)

WIND SPEED RANGE

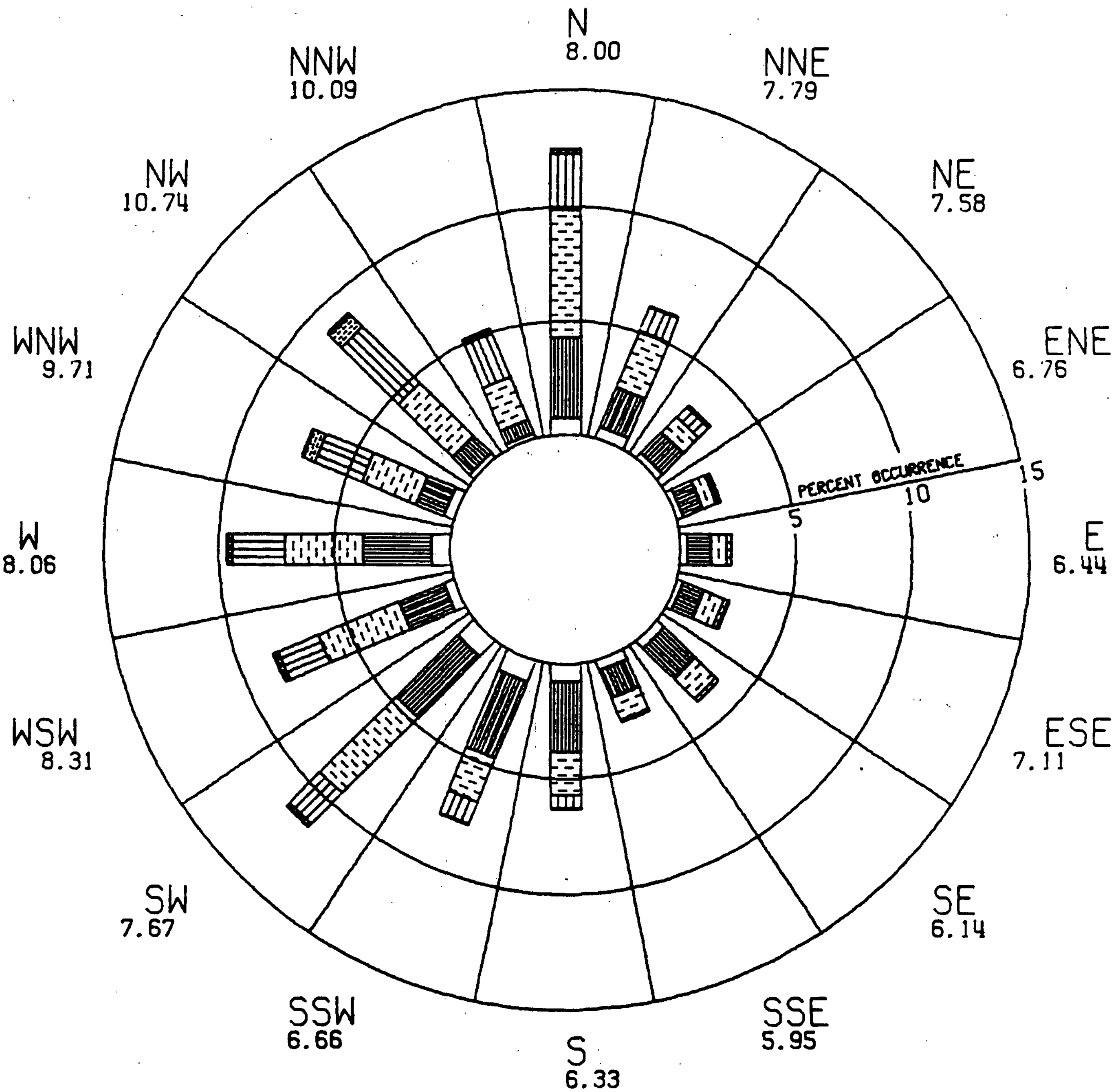
☐	0- 3 KNOTS
▥	4- 6
▤	7-10
▥	11-16
▩	17-21
■	› 21

NEWARK, NEW JERSEY

SEASONAL WIND ROSE (JUN-AUG)

CCC533

FIGURE C-4



SECTOR MEAN WIND SPEED (KNOTS)

WIND SPEED RANGE

0- 3	KNOTS
4- 6	
7-10	
11-16	
17-21	
› 21	

NEWARK, NEW JERSEY

SEASONAL WIND ROSE (SEP-NOV)

CCC534

FIGURE C-5